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COTTONWOOD-WALNUT CREEK WATERSHED

CHAVES AND EDDY COUNTIES, NEW MEXICO

FINAL ENVIRONMENTAL IMPACT STATEMENT

Marion E. Strong
State Conservationist
Soil Conservation Service

Sponsoring Local Organizations

Cottonwood-Walnut Creek Watershed District
P. O. Box 235
Artesia, New Mexico 88210

Central Valley Natural Resource Conservation District
2110 North Freeman
Artesia, New Mexico 88210

Penasco Natural Resource Conservation District
Hope, New Mexico 88250

Hagerman-Dexter Natural Resource Conservation District
Hagerman, New Mexico 88232

New Mexico State Park and Recreation Commission
P. O. Box 1147
Santa Fe, New Mexico 87501

New Mexico Department of Game and Fish
State Capitol
Santa Fe, New Mexico 87501

June 1975

Prepared by:

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
Albuquerque, New Mexico 87103

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USDA ENVIRONMENTAL IMPACT STATEMENT^{1/}

COTTONWOOD-WALNUT CREEK WATERSHED PROJECT
CHAVES AND EDDY COUNTIES
NEW MEXICO

Prepared in Accordance with
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Summary

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- I Final CATALOGING - PREP.
- II Soil Conservation Service
- III Administrative
- IV Description of project and action: The project is planned for watershed protection, flood prevention, and recreational development in Chaves and Eddy Counties, New Mexico. Installation of the project will be implemented by the Sponsoring Local Organizations with Federal assistance under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666, as amended).

The work plan for the watershed project provides for:

1. Land treatment on 140,000 acres of rangeland and 20,000 acres of irrigated cropland.
2. Eleven floodwater retarding structures.
3. One multiple-purpose structure with floodwater retarding and recreation storage capacity.
4. Basic recreational facilities.
5. Five floodwater diversions with grade stabilization structures.
6. Three channels with grade stabilization structures. Channel work involves about 9.7 miles of which 4.8 miles is new channel construction and 4.9 miles is channel enlargement. The channel enlargement is primarily on Cottonwood Creek, an existing stream with limited intermittent flow on the lower end and ephemeral flow in the other reaches.

^{1/} All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigation by U.S. Department of Agriculture, Soil Conservation Service.

V Summary of Environmental Impacts and Adverse Environmental Effects:

1. Development of, and more efficient use of, the water and related land resources in the watershed.
2. Reduction of average annual flood damages by about 91 percent.
3. Reduction of sediment yield from the watershed into the Pecos River by 45 percent or an average annual reduction of about 10,220 tons per year.
4. Provide protection from the 100-year frequency flood (one percent chance of occurrence) to approximately 100 homes and 10 business firms in north Artesia.
5. Provide a high degree of flood protection to approximately 6,000 acres of irrigated cropland and improve the quality of living conditions throughout the project area.
6. Reduce the area flooded by the one percent chance of occurrence flood from 6,396 acres to 1,715 acres.
7. Reduce the peak flow from a flood with a one percent chance of occurrence on Cottonwood Creek at the bridge of Alternate U.S. 285 from 17,700 cubic feet per second to 1,500 cubic feet per second; and the peak flow on Walnut Creek at the bridge of Alternate U.S. Highway 285 from 10,200 cubic feet per second to 3,400 cubic feet per second.
8. Provide recreation opportunities to 144,000 people who live within a reasonable distance of the watershed or 63,970 annual recreational visits.
9. Provide average annual net benefits of \$109,800.
10. Reduce ponding of shallow water from flood flows which will in turn reduce mosquito breeding areas.
11. Approximately 7,645 acres of agricultural land will be committed to dams, reservoirs, spillways, floodwater diversions, channels, and recreation facilities. Agricultural use on about 2,400 additional acres will be intermittently interrupted by flooding in detention pools and along floodwater diversions.
12. Some air pollution from dust and some increase in the noise level will be experienced during construction.
13. Lower the quality of wildlife habitat temporarily on about 6,000 feet of existing channels.
14. Disturb identified archeological and historic sites.

15. Estimated loss of water from evaporation by installation of the project measures is 750 acre-feet annually.

VI List of alternatives considered:

1. Land treatment only.
2. Land treatment, floodwater retarding structures, and floodwater diversions.
3. Land treatment, channels, and floodwater diversions.
4. Land treatment, floodproofing, flood insurance, zoning, and converting agricultural floodplain lands into uses more tolerant to flooding.
5. No project.

VII Agencies from which written comments have been received:

Department of the Army
Department of Health, Education, and Welfare
Department of the Interior
Environmental Protection Agency
Department of Transportation
Advisory Council on Historic Preservation
New Mexico State Engineer (Governor's Representative)
New Mexico State Planning Office (State Clearinghouse)
New Mexico State Historic Preservation Officer
New Mexico Environmental Improvement Agency

VIII Draft Statement Transmitted to CEQ on February 25, 1975.

USDA-SOIL CONSERVATION SERVICE

FINAL

ENVIRONMENTAL IMPACT STATEMENT

for

COTTONWOOD-WALNUT CREEK WATERSHED, NEW MEXICO

Installation of this project constitutes an administrative action. Federal assistance will be provided under the authority of Public Law 566, 83rd Congress, 68 Stat. 666, as amended.

Sponsoring Local Organizations: Cottonwood-Walnut Creek Watershed District, Central Valley Natural Resource Conservation District, Penasco Natural Resource Conservation District, Hagerman-Dexter Natural Resource Conservation District, New Mexico State Park and Recreation Commission, and New Mexico Department of Game and Fish.

Project Purposes and Goals: Watershed protection, flood prevention, and recreational development.

The Sponsoring Local Organizations, the general public, and the Soil Conservation Service have formulated a project to protect and enhance the quality of living conditions and the environment in the watershed. This is to be accomplished by accelerating the establishment of land treatment on rangeland and irrigated cropland to reduce soil erosion and increase the productivity of the land. This will improve the rangeland habitat for livestock and wildlife and help maintain the productivity of the soil for sustained agricultural production on the cropland.

The quality of life and general economic conditions will be improved by reducing flood damage. Family standards of living will be enhanced to the degree that flood losses are prevented. The level of flood protection agreed upon will enhance the quality of life and the natural environment by preventing loss of income, loss of land resources, and loss of wildlife habitat.

A recreation development in the watershed will provide activities such as fishing, camping, picnicking, and water-based hunting in an area where these opportunities are limited. The recreation development will require water rights now being used on approximately 591 acres of irrigated cropland.

Watershed protection will be achieved by the application of needed land treatment. The goals for achieving adequate land treatment were established by the local sponsors during project formulation. This was accomplished by reviewing the amount of treatment still needed on the watershed lands for each major land use.

Records indicated that about 34 percent of the rangeland in the watershed had been adequately treated by proper grazing use and deferred grazing. A goal for achieving these land treatment measures on an additional 70,000 acres during the project installation period was set. If achieved, this goal will result in adequate treatment on about 70 percent of the rangeland to reduce erosion and improve forage production for livestock and improve wildlife habitat to the level practicable under the existing climatic conditions.

Formulation of land treatment goals for irrigated cropland, which are to be applied during the project installation period, was established by the local sponsors. Some type of treatment is to be applied on about 20,000 acres of cropland. This includes improved cropping systems, irrigation water management, irrigation ditch lining, irrigation pipeline, land leveling, and overnight farm irrigation storage ponds or reservoirs.

Flood prevention will be achieved by the installation of structural measures. The minimum level of flood protection was agreed upon during project formulation. Flood protection needs were determined for each major drainage based on its past history of damage. Flood protection was found to be needed on irrigated cropland and other improvements in the floodplain, including farm residential property, roads, the railroad, and an urban area in the north end of Artesia.

The goal of flood prevention in the north end of Artesia is protection from flooding up to and including the 100-year frequency flood (1 percent chance of occurrence). The goal for protecting agricultural areas from flooding is reduction of the average annual damage by 75 percent throughout the watershed.

The following tabulation shows the acres of land flooded by major drainages under future conditions without the project.

<u>Drainage</u>	<u>Percent Chance Flood</u>	<u>Acres Flooded</u>
<u>Cottonwood Creek</u>	1	4,832
	4	3,920
	10	2,656
	50	60
<u>Walnut Creek</u>	1	1,564
	4	1,394
	10	1,001

Recreation development was a significant goal of project formulation. This area of the state has insufficient opportunities for water-based recreation. Project formulation by the sponsoring organization recognized this need. They included the development

of a recreation reservoir in a multiple-purpose structure with associated basic facilities for other water-related recreation as a project purpose.

The design daily capacity during the heavy use season on a Sunday is as follows:

Fishing	240
Camping	90
Picnicking	<u>420</u> (2 uses per unit)
TOTAL	750

PLANNED PROJECT

The planned project includes land treatment measures and structural measures. The estimated project installation costs are as follows:

Project Costs	Total Cost	PL-566 Funds	Other Funds
	\$	\$	\$
Land Treatment	2,254,500	82,300	2,172,200
Structural Measures	9,800,600	8,711,000	1,089,600
TOTAL	12,055,100	8,793,300	3,261,800

No insecticides, pesticides, or other chemicals are planned for use in the installation of the project measures. They may be used in operation and maintenance of the basic recreation facilities.

Land Treatment is planned on rangeland and irrigated cropland which at present is not adequately treated for watershed protection, conservation of water and land resources, or increased agricultural production.

There are 66,650 acres of public domain lands classed as rangeland in the watershed. These lands are administered by the Bureau of Land Management. Land treatment is needed on approximately 39,900 acres of the public domain. The planned treatment measures needed were cooperatively determined with technical assistance from the Bureau of Land Management and the Soil Conservation Service. The principal treatment will be proper grazing use and deferred grazing, to increase ground cover and forage production on the 39,900 acres.

State and privately-owned rangeland in the watershed amounts to 128,617 acres. Land treatment is needed on about 100,100 acres of the state and privately-owned rangelands. The principal

treatment planned is proper grazing use and deferred grazing with associated measures of livestock water development and fencing for better livestock control and distribution.

The irrigated cropland is all privately-owned and amounts to 24,238 acres. Land treatment is planned on about 20,000 acres of irrigated cropland. The principal treatment measures planned are irrigation /water management on 8,000 acres, land leveling on 4,000 acres, improved irrigation systems and improved cropping systems on 3,400 acres.

Structural Measures planned for the watershed consist of 11 floodwater retarding structures, 1 multiple-purpose structure for floodwater retardation and recreation storage, 5 floodwater diversions, and 3 channels (see Figures 1 to 6). The areas disturbed by construction will be seeded to adapted grasses, and the seeded areas will be fenced.

The 11 floodwater retarding structures will temporarily retard floodwater from approximately 256 square miles of drainage. These structures are planned to provide 29,387 acre-feet of temporary floodwater retarding capacity and 3,841 acre-feet of sediment storage over the project life of 100 years. The dams range in height from 12.3 feet to 56.9 feet. The estimated earthfill to construct the 11 floodwater retarding structures is approximately 3,573,600 cubic yards. All of the floodwater retarding structures will be constructed on yielding foundations. The floodwater retarding pools in the 11 structures will cover 3,360 acres. Existing fences within the construction easements will be removed and replaced or relocated by the Sponsoring Local Organization.

The floodwater retarding structures are designed with dry pools. Ungated openings in the principal spillway risers will drain the flood volume produced by a 25-year, 6-hour storm, in 96 hours or less as required by the New Mexico State Engineer. The principal spillways will consist of reinforced concrete pipe conduits ranging in size from 24 to 60 inches in diameter and will be constructed on yielding foundations. The principal spillway inlets will be single stage, standard covered risers. Sites 1, 3, 4, 5, 7, 8, 13B, 14, and 15 will be constructed with earth emergency spillways. Site 6 will have a concrete emergency spillway with an auxiliary earth emergency spillway. The emergency spillway at Site 17A will be rock.

Temporary retarding storage and principal spillway flows in the 11 structures will provide control from flood runoff produced from storms up to and including the 100-year frequency flood (1 percent chance of occurrence). Borrow material will be from sediment pool areas and from emergency spillways. All floodwater retarding structure sites except 15 and 17A have low to high plasticity clay overlying clayey calcareous gravels. At Site 15 the embankment

fill material will be primarily silty fine sands. Site 17A has large quantities of low plasticity silt with smaller amounts of low plasticity clays and some silty sands.

Land rights needed for installation of the 11 floodwater retarding structures are estimated to be 4,992 acres of rangeland for construction easements. About 2,055 acres of rangeland and 26 acres of cropland will be required for flowage easements. The land rights will be acquired from 56 private landowners, the State of New Mexico, and the Bureau of Land Management. In addition, 21 subordination agreements for roads and utilities will be required.

Measures to minimize air and water pollution will be followed during construction. Erosion of soil and pollution of the air by dust will be held to a minimum by sprinkling roads in the work area, wetting down borrow areas, use of mulch, vegetation, diversions, traps, and debris basins. Water pollution will be minimized by installing culverts at road crossings and by locating sanitary facilities in areas that will prevent contamination of surface and sub-surface water supplies.

Multiple-purpose structure (Site 19) is planned with a storage capacity of 4,150 acre-feet. The recreation pool will store 1,143 acre-feet; 2,390 acre-feet are for floodwater retardation and 617 acre-feet for sediment storage. The maximum height of the dam is 47.9 feet, and the estimated cubic yards of earthfill is 793,700. The recreation pool surface area is designed to be 150 acres; the sediment pool is to be 108 acres; and the floodwater retarding pool will be 365 acres. The principal spillway will be a reinforced concrete box installed at the elevation of the top of the recreation pool. The emergency spillway will be constructed with soil cement with a two-foot thick reinforced concrete cap extending from crest elevation to the end of the outlet floor.

The Site 19 embankment foundation consists of compressible silt and silty clay from 5 to 10 feet thick that overlies preconsolidated sand and gravel, weathered sandstone bedrock, and conglomerate. The principal spillway will be constructed on a yielding foundation. Embankment fill material will be clayey silt and silty clay.

This structure is designed for a 100-year effective life and will temporarily retard the runoff from a 100-year frequency flood. Site 19, in series with planned floodwater retarding structures at Sites 5, 6, 7, 8, 14, and 15, will control 127.98 square miles of drainage. The recreation pool will be used for fishing, hunting, and boating. The average size of the recreation pool will be about 120 surface acres.

Basic recreational facilities will be constructed on approximately 184 acres of land adjacent to Site 19. Fourteen acres will be landscaped. The basic facilities include 60 units in two locations

suitable for both picnic and camping use, a boat launching ramp, sanitary facilities, and free parking areas for fishermen and hunters using the recreation reservoir at Site 19.

Parking areas provided in the preliminary plan include space for 50 cars with 500 square feet per space which will be sufficient for a car and trailer. The parking area will be surfaced with gravel. The detailed engineering and architectural plans will not be undertaken until the project has been approved and funded. Runoff from roads and parking areas will be taken care of in detail design to prevent pollution of the recreation pool.

Disposal of wastes from the chemical toilets will be by pumping into a tank. Transportation and ultimate disposal will be into the Artesia municipal sewage treatment system. The comfort station will be located in Area 1, as designated on Figure 2. Solid wastes will be collected daily, transported, and disposed of into the Artesia municipal solid waste facility.

Land requirements needed for installation of Site 19 with basic facilities include 533 acres of rangeland and 6 acres of flowage easements from one landowner. Three subordination agreements for roads and utilities will be needed.

The reservoir area will be cleared of existing fences, trees, and brush. The recreational area development will be landscaped by planting grass, shrubs, and trees. Dust pollution during construction will be controlled by sprinkling roads in the work area and by wetting down borrow areas prior to excavation. Borrow material will be excavated from the reservoir area.

Five floodwater diversions totaling about 13.9 miles (73,400 feet) are planned to transport principal spillway discharges and flood flows from uncontrolled areas to existing channels or other planned structures. The five floodwater diversions will transport the runoff from 14.90 square miles of drainage into structures and existing channels and eventually to the Pecos River. All the floodwater diversions are planned to transport the peak flow produced by a one percent chance storm (100-year frequency). A freeboard of 2 feet is planned above this water surface.

Floodwater diversions range from about 3 feet to 6.4 feet in height and have bottom widths up to 120 feet. Floodwater diversions will be constructed through material including low plasticity clays, gravelly clays, clayey gravels, silty clays, and hard caliche-type rock.

Land required for the installation of the floodwater diversions is all rangeland. It is to be obtained from 15 private owners, the State of New Mexico, the Bureau of Land Management, and the City of Artesia. Installation of the diversions will require about 1,527 acres for construction and 340 acres for flowage easements.

Fifteen subordination agreements for roads and utilities will be required.

Approximately 9.7 miles of channel work is planned. This work will consist of about 4.8 miles of new channel construction, and the remaining 4.9 miles will be enlargement and modification of existing channels. The channels planned are to convey principal spillway discharges from the structures and uncontrolled areas below the structures to the Pecos River.

About 3.0 miles of new channel construction will be through irrigated cropland, and the remaining 1.8 miles will be constructed through rangeland. The existing 4.9 miles of channels flow through both irrigated cropland and rangeland. The existing channels are unmodified, well-defined natural channels with ephemeral flow in most of the reaches. Periodically, irrigation return flows and seepage may produce limited intermittent flow into the Pecos River.

The planned channel work includes about 1.1 mile of high value wildlife habitat on Cottonwood Channel and Channel 300 that will be preserved, when possible, by channel modification or channel realignment to prevent damage or loss of the habitat. Any wildlife habitat destroyed will be replaced to the greatest practicable extent by planting selected species of trees.

The high quality wildlife habitat that will be affected by channel work supports the following types of wildlife: ringneck and whitewing pheasant, cottontail rabbit, mink, skunk, raccoon, shorebirds, mourning doves, tree nesting songbirds, scaled quail, and small mammals.

Land rights required for installation and operation of the channels include 593 acres of construction easements and 32 subordination agreements for roads, a railroad, irrigation ditches, and utilities. Construction easements involve approximately 413 acres of rangeland and 180 acres of cropland.

Construction of channels will be scheduled during the winter and early spring months so that the likelihood of erosion from floods will be minimized.

Details on each of the three channels are described as follows: Channel 300, about 18,500 feet long, will transport the principal spillway discharge of Site 3 from the dam to the floodplain of Cottonwood Creek. There is no existing channel. The new channel will be constructed mostly through irrigated cropland, in materials consisting of low plasticity clays from 3 to 12 feet deep, where a layer of slightly clayey sand and gravel from 1.0 foot to 2.8 feet thick is found along part of the channel.

Drop spillway structures requiring approximately 588 cubic yards of reinforced concrete are to be installed for channel stabilization. Two will be installed in conjunction with culverts and turn structures

at Station 182+60 (13th St.) and Station 259+67 (County Road west of old Highway 285). One will be in conjunction with a culvert and rectangular concrete channel at Station 275+00 (Atchison, Topeka & Santa Fe (AT&SF) Railroad). A low water road crossing is to be installed at Station 130+00 (26th Street).

Slope protection will be provided at the turn located at Station 196+50. It will require approximately 205 cubic yards of rock. Side drain inlet structures will be provided as needed. Existing irrigation facilities crossing the planned channel will be modified and reconstructed. Disturbed areas will be seeded to adapted grasses to reduce erosion.

Channel 300 includes approximately 200 feet of high value wildlife habitat which will be preserved by aligning the channel to avoid damage to the habitat. Any accidental damage to the habitat will be mitigated by planting selected species of trees.

Land rights required include 190 acres of construction easements and 17 subordination agreements where existing utilities, roads, a pipeline, and a railroad cross the planned channel.

Channel 500 will transport the principal spillway discharge of Site 5 to Cottonwood Creek. It will follow the existing natural channel for about the first 1,500 feet. Thereafter, it will be realigned and a new channel excavated through rangeland. The first 2,000 feet will be constructed in caliche gravel. The remainder will be in alternating segments of caliche gravel and gravelly soils with indurated gravels at the exit into Cottonwood Creek. Approximately 67 acres of construction easements and one subordination agreement are the required land rights for channel 500.

All-weather road crossings will be provided at stations 20+00 and 51+00. A flume will be installed at station 21+00 where the channel intersects an existing concrete-lined ditch. Standard drop structures will be constructed approximately at stations 21+00 and 69+00 for channel stability. They will require about 80 cubic yards of reinforced concrete. Disturbed areas will be seeded to adapted grasses to reduce erosion.

Cottonwood Channel begins at a point approximately 3,000 feet downstream from U.S. Highway 285 (station 678+00). It follows the existing creek from this point to station 880+00, which is about 2,000 feet downstream from the intersection with Alternate U.S. Highway 285 and the AT&SF Railroad. This portion of the channel will be improved and proportioned to carry the routed 100-year peak flow from the drainage area below Site 19 plus the 100-year principal spillway flow from Site 19.

From station 880+00 to the Pecos River (station 936+00) a new alignment direct to the river will be followed. Capacity for this section will be the 100-year principal spillway outflow from Site 19.

Materials along the channel banks from about station 678+00 to station 895+00 consist of low plasticity, slightly calcareous clay. The creek bottom from station 530+00 to station 655+00 consists of hard limestone conglomerate. From station 655+00 to approximately station 840+00 the creek bottom consists of materials varying from sands (SW) to gravels (GW). From station 840+00 to the Pecos River materials consist of low plasticity clays (CL). Several grade stabilization structures are planned for channel stability. Upstream from the first structure at station 678+00, diking will be required to direct flows to the structure. Disturbed areas will be seeded to adapted grasses to reduce erosion.

Land rights include 336 acres of construction easements and 14 subordination agreements where utilities, roads, a railroad, and pipelines cross the channel. Under present conditions there will be no relocation of displaced persons, business, or farm operation resulting from acquisition of land rights for Cottonwood Channel.

Side drain inlets will be provided to allow local runoff to enter the channel. A low water road crossing will be provided at station 815+00 (County Road). Minor work will be done, reinforcing and underpinning the existing railroad and road bridge piers and abutments.

Cottonwood Channel contains an aggregate total of approximately 5,800 feet of high value wildlife habitat, which will be preserved by channel realignment or excavating only one side of the existing channel. Any wildlife habitat destroyed or adversely affected by channel work will be replanted with selected species of trees.

Archeological, Historical and Unique Scenic Areas: The Museum of New Mexico was furnished maps showing locations of proposed construction sites. The Museum has made a field investigation of the watershed and prepared a report recommending excavation and further study of the 4 prehistorical and 10 historical sites that are in or near the proposed construction areas for structural measures. 1/ Mitigation of the adverse effects of the project on the cultural resources will be accomplished by excavation and salvage. This will be done by professional archeologists from the National Park Service prior to construction of the project measures. The National Park Service will be informed of the construction schedule and any changes in the schedule. Executive Order 11593 will be complied with in carrying out the watershed project.

Operation and Maintenance: Land treatment measures on private, state-owned, and isolated tracts of federal land administered by the Bureau of Land Management will be maintained by the landowner

1/ An Inventory of Archeological and Historical Remains in the Cottonwood-Walnut Drainage, Chaves and Eddy Counties, New Mexico - August 1974. (Museum of New Mexico.)

or operator for which these measures are applied under agreement with the Central Valley, the Penasco, and the Hagerman-Dexter Natural Resource Conservation Districts. The Bureau of Land Management and lessees will maintain land treatment measures installed on relatively large contiguous blocks of federal land administered by them.

Representatives of the Sponsoring Local Organizations and the Soil Conservation Service will make a joint inspection of the structural measures annually and after each major flood. The inspection(s) will be made to determine the need for maintenance and repair, and if required, when it will be accomplished. A report of the inspection will be made, and a copy of the report will be furnished to the New Mexico State Engineer.

Operation and maintenance of the floodwater retarding structures may include repair of flood damage to emergency spillways, the earth embankment fills, fences, and vegetation on disturbed areas and keeping the principal spillways in proper operating condition. Operation and maintenance work on floodwater diversions and channels may involve removal of sediment and debris and maintenance of associated stabilization structures.

The operation and maintenance of the structural measures, except the recreation reservoir and basic facilities, will be the responsibility of the Cottonwood-Walnut Creek Watershed District. The average annual operation and maintenance cost of the floodwater retarding structures, channels, the multiple-purpose dam at Site 19, and floodwater diversions is estimated to be \$46,200. The Cottonwood-Walnut Creek Watershed District will assess the benefited landowners to establish and maintain funds necessary to operate structural measures, for which they assume responsibility.

Operation, maintenance, and replacement of basic recreational facilities will be the responsibility of the New Mexico Park and Recreation Commission. The facilities will operate and be open to the public year-long, and provisions will be made for free access to fishermen and hunters. Areas where hunting is permitted will be determined by the State Park and Recreation Commission. The recreation facilities will be designed for access and use by the physically handicapped to the extent practicable.

Estimated average annual operation, maintenance, and replacement cost of the basic recreational facilities will amount to \$19,700. This includes the estimated average annual cost of \$4,800 for replacement of basic facilities and an average annual cost of \$14,900 for custodial care, policing, sanitation, safety, and other operational services of the recreation facilities.

The estimated average annual cost of maintaining water in the recreation pool at Site 19 and water for use at the basic facilities

is \$7,800. This annual cost of pumping about 767 acre-feet of water will be the responsibility of the New Mexico State Park and Recreation Commission.

The New Mexico Department of Game and Fish will be responsible for the establishment and continuing management of the warm water fishery and a winter trout program. Estimated average annual cost of stocking and maintaining the fishery is \$6,700.

Releases of water from the multiple-purpose structure, Site 19, will be required to satisfy downstream water rights. To determine the time and rate of such releases will require the establishment and operation of inflow and outflow continuous measuring devices constructed and maintained in a manner suitable to the State Engineer and at the expense of the sponsors. The basic recreational facilities and recreation area will be policed and maintained in a manner to insure the safety and health of the public users. The New Mexico Department of Game and Fish and the New Mexico State Park and Recreation Commission, by virtue of existing statutes, will have authority to regulate uses of the lake in the interest of public safety and wildlife and to exclude speedboating and water skiing. The New Mexico State Park and Recreation Commission will regulate boating uses to self-propelled boats, sailboats, and electric motor trolling boats. No gasoline-powered motor boats will be permitted. The New Mexico State Park and Recreation Commission will also have complete authority over operation of Site 19 as a state park and will establish rules and regulations to facilitate the operation and control of the area.

The Cottonwood-Walnut Creek Watershed District and the Soil Conservation Service will enter into a specific operation and maintenance agreement prior to signing a project agreement. The estimated average annual operation, maintenance, and replacement cost for the structural measures and the recreation development is \$80,400.

The local sponsors will be responsible for the maintenance of tree and shrub plantings made as mitigation or enhancement measures. The operation and maintenance of structural measures will be carried out in compliance with requirements of state and local health agencies which include measures to mitigate potential mosquito breeding areas.

Pesticides and insecticides may be used, as required, to control diseases on plants established in landscaping the basic facilities and park area and to control houseflies at the comfort station and chemical toilets. Pesticides and insecticides will be applied as needed by the New Mexico State Park and Recreation Commission in conformity with existing state and federal regulations and guidelines.



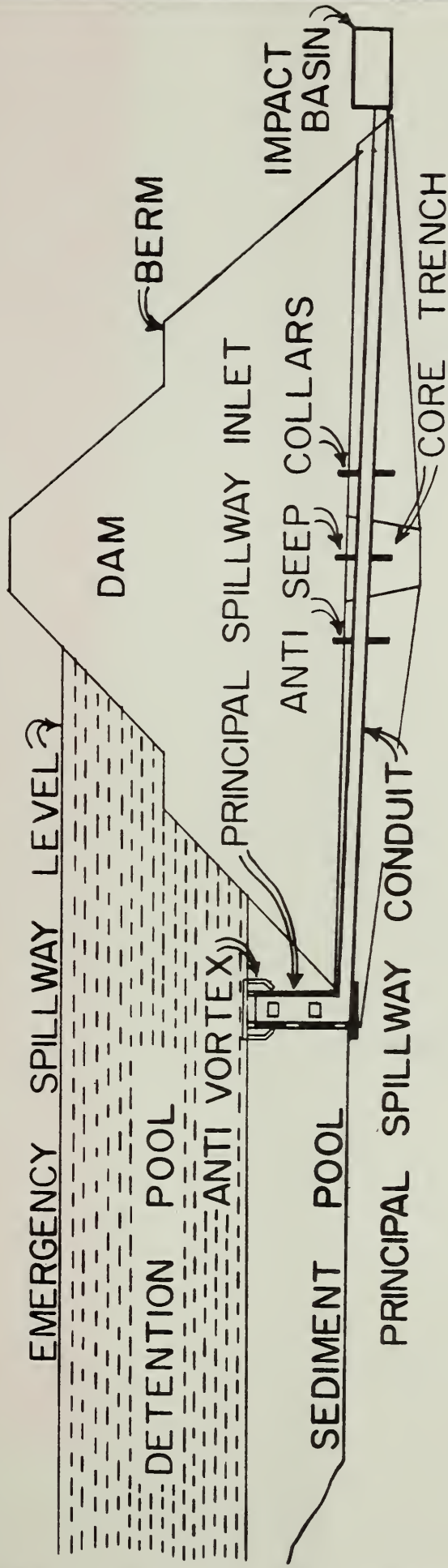


FIGURE 1
SECTION OF A TYPICAL

FLOODWATER RETARDING STRUCTURE

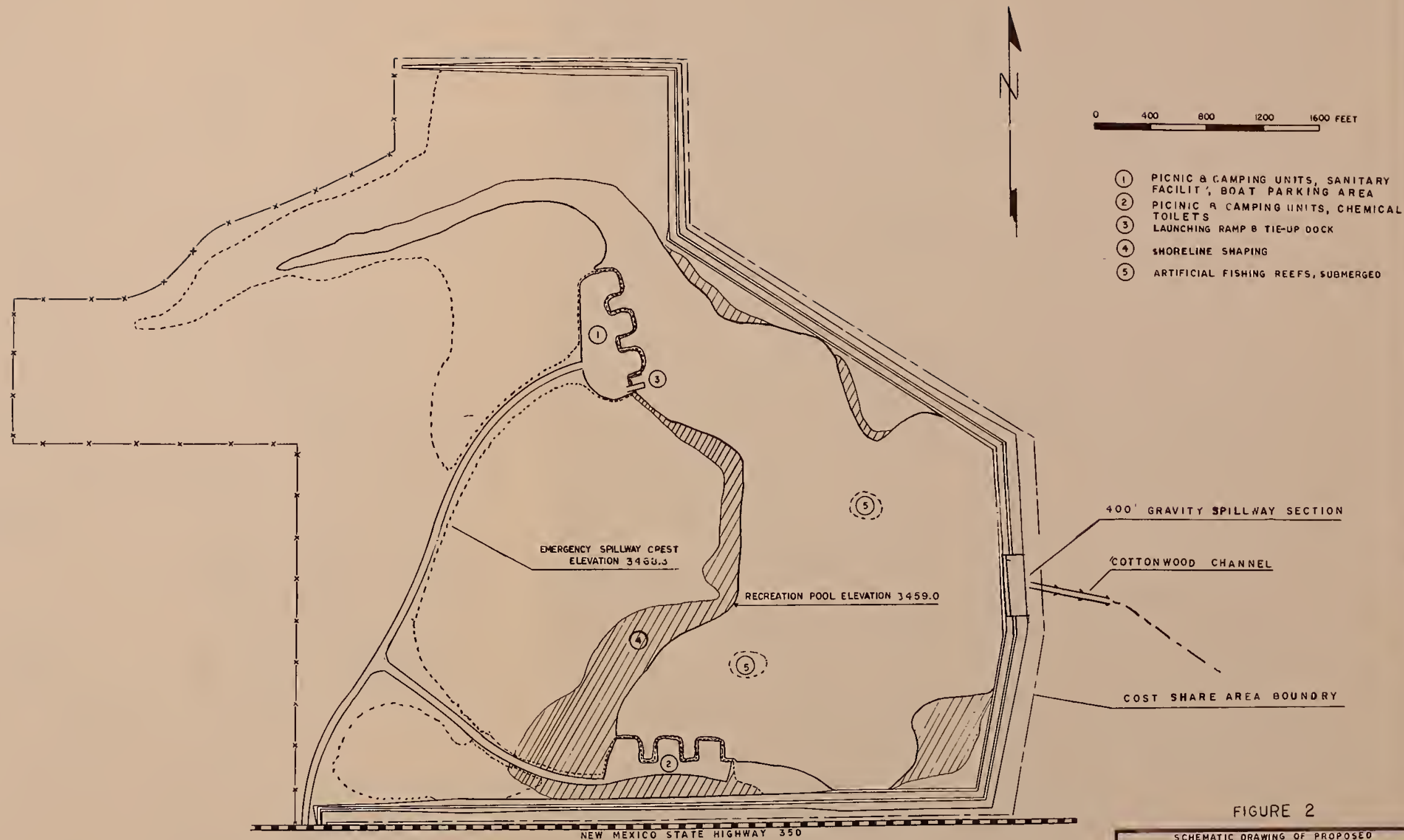


FIGURE 2

SCHEMATIC DRAWING OF PROPOSED
RECREATIONAL DEVELOPMENT
SITE 19
COTTONWOOD-WALNUT CREEK WATERSHED
EDDY & CHAVES COUNTIES, NEW MEXICO
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	E.S. - NMSP.B.R.C.	Date	3-74	Approved by	
Drawn	W.V.P. & B.A.R.	Date	4-74	Title	
Traced		Date		Title	
Checked		Date		Title	

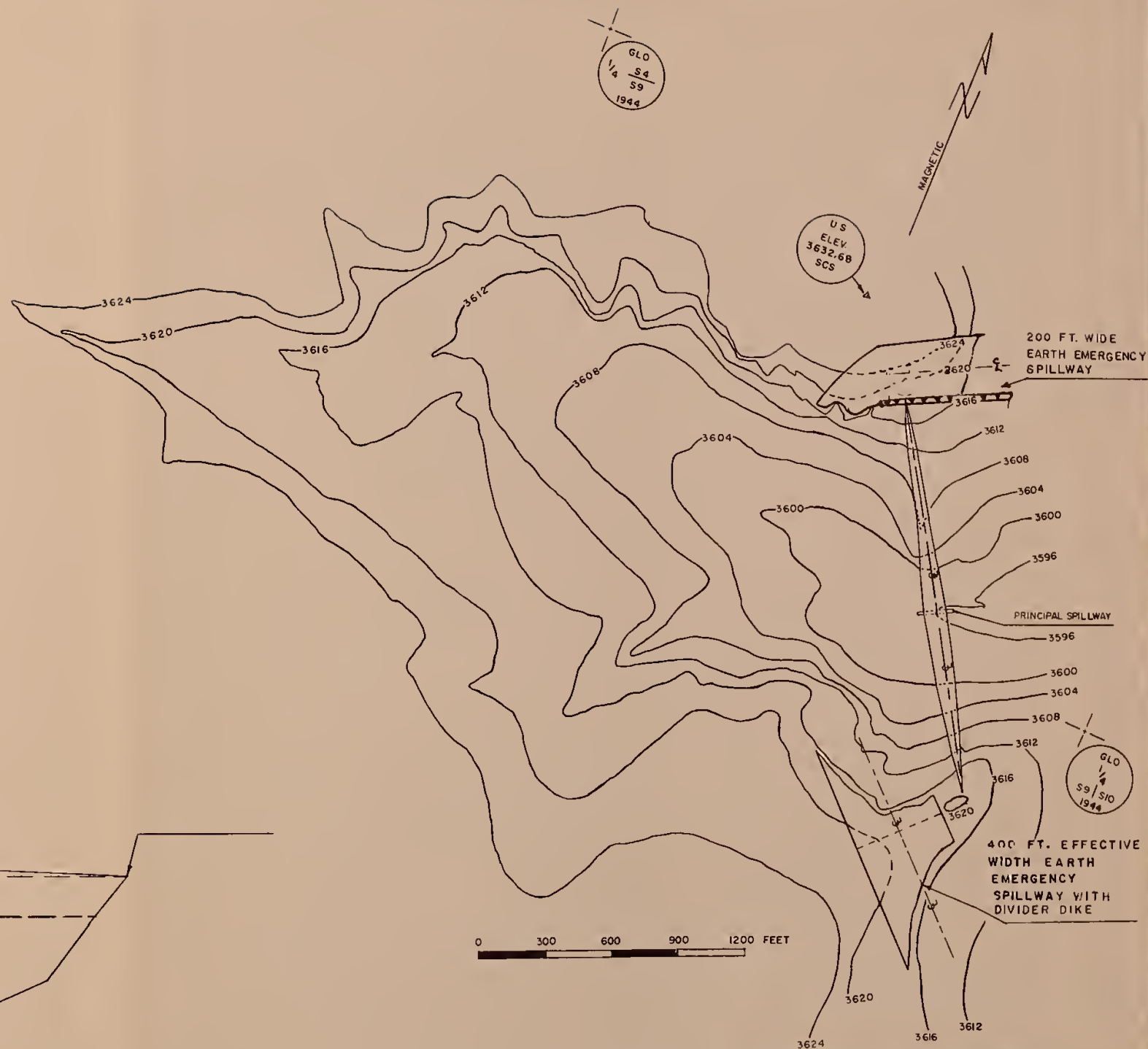
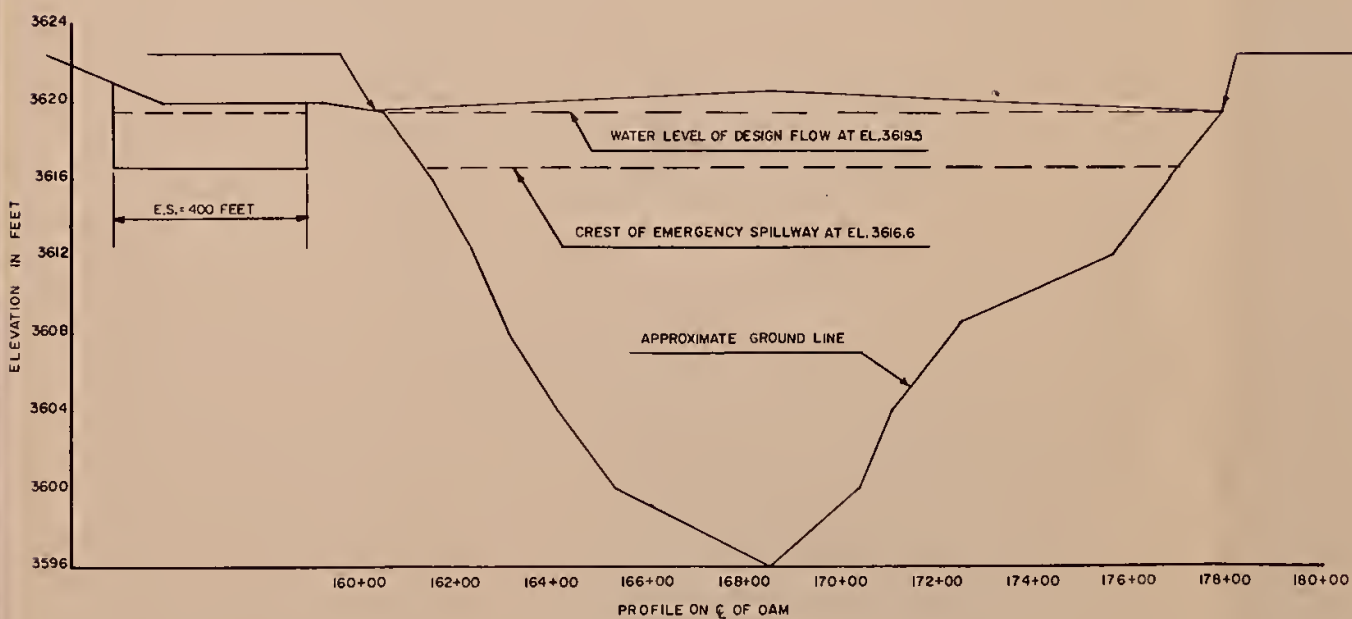
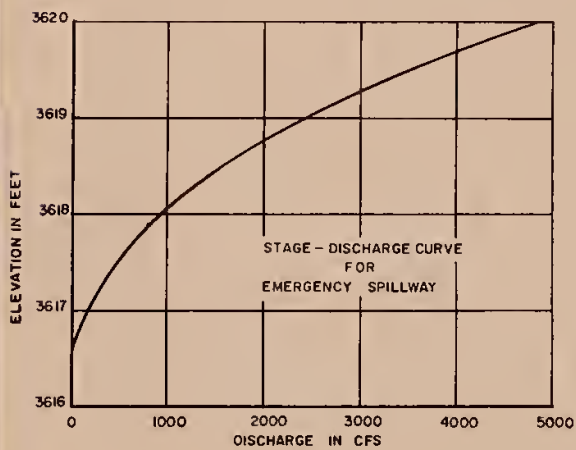
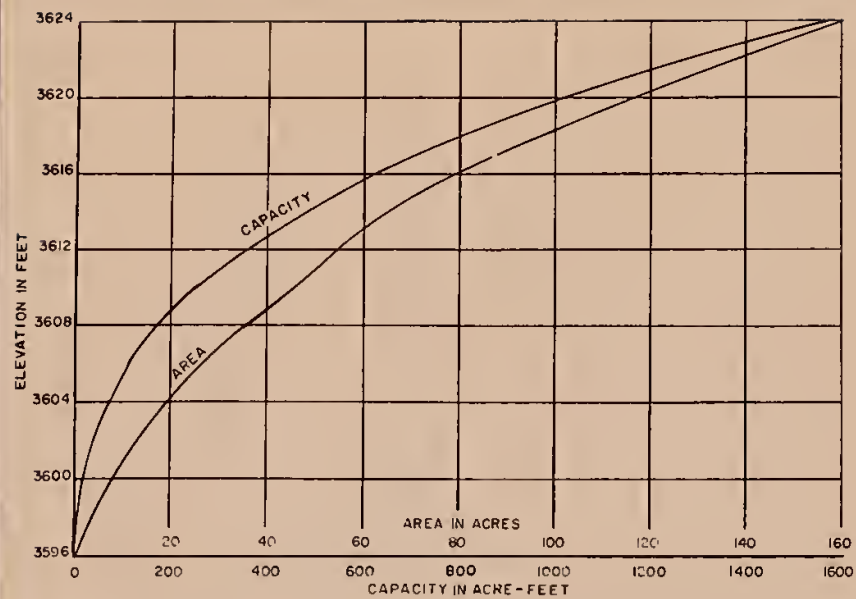


FIG. 3

TYPICAL FLOODWATER RETARDING STRUCTURE
WITH EARTH EMERGENCY SPILLWAYS
COTTONWOOD-WALNUT CREEK WATERSHED
EDDY & CHAVES COUNTIES, NEW MEXICO

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	WHE & RDA	Date	Approved by
Drawn	BPE		Title
Traced	BPE		Title
Checked	WHE & RDA		No. Drawing No.



0 400 800 1200 1600 FEET
TYPICAL FLOODWATER RETARDING STRUCTURE

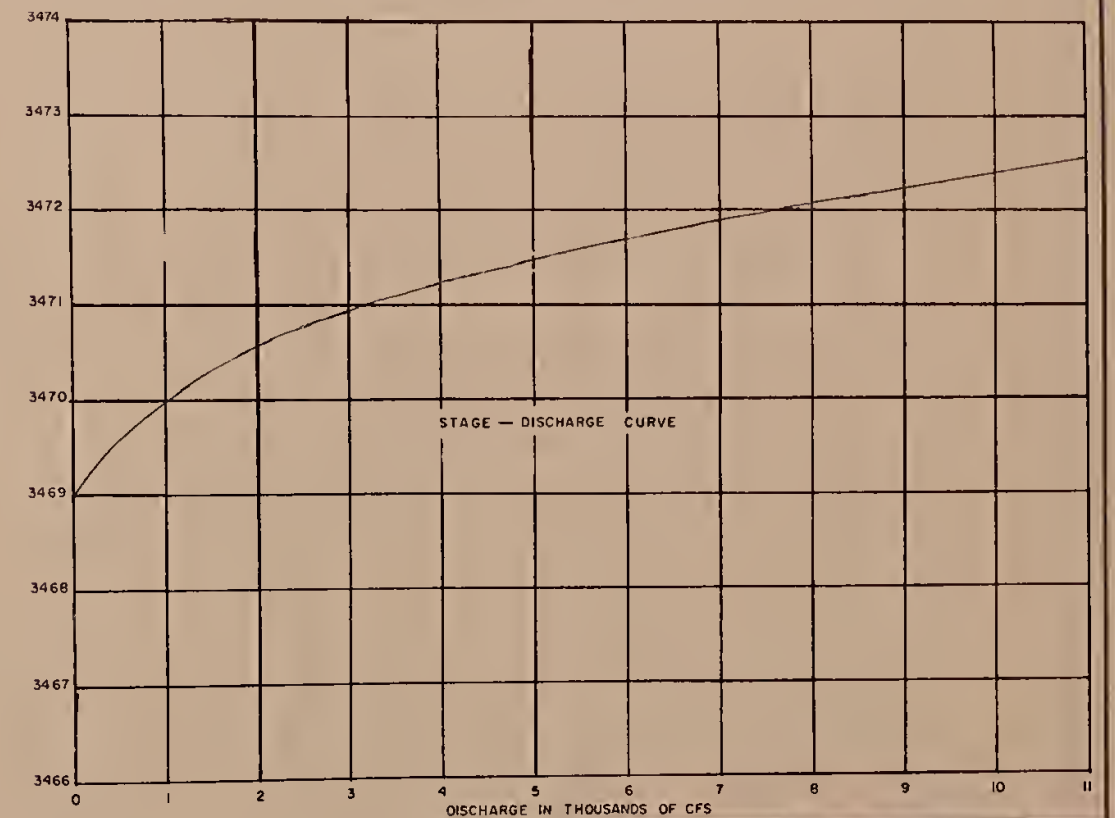
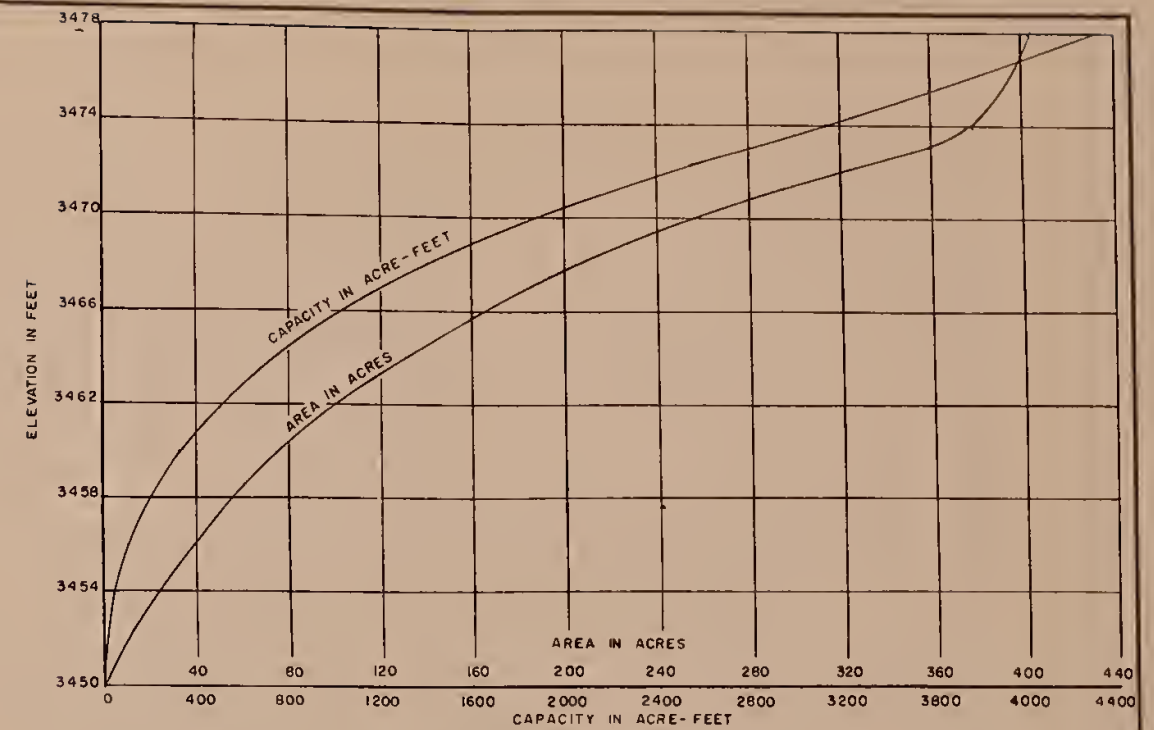


FIG. 4

TYPICAL FLOODWATER RETARDING STRUCTURE
WITH EARTH EMERGENCY SPILLWAY
COTTONWOOD-WALNUT CREEK WATERSHED
EDDY & CHAVES COUNTIES, NEW MEXICO
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed: WHE B RDA	Date:	Approved by:
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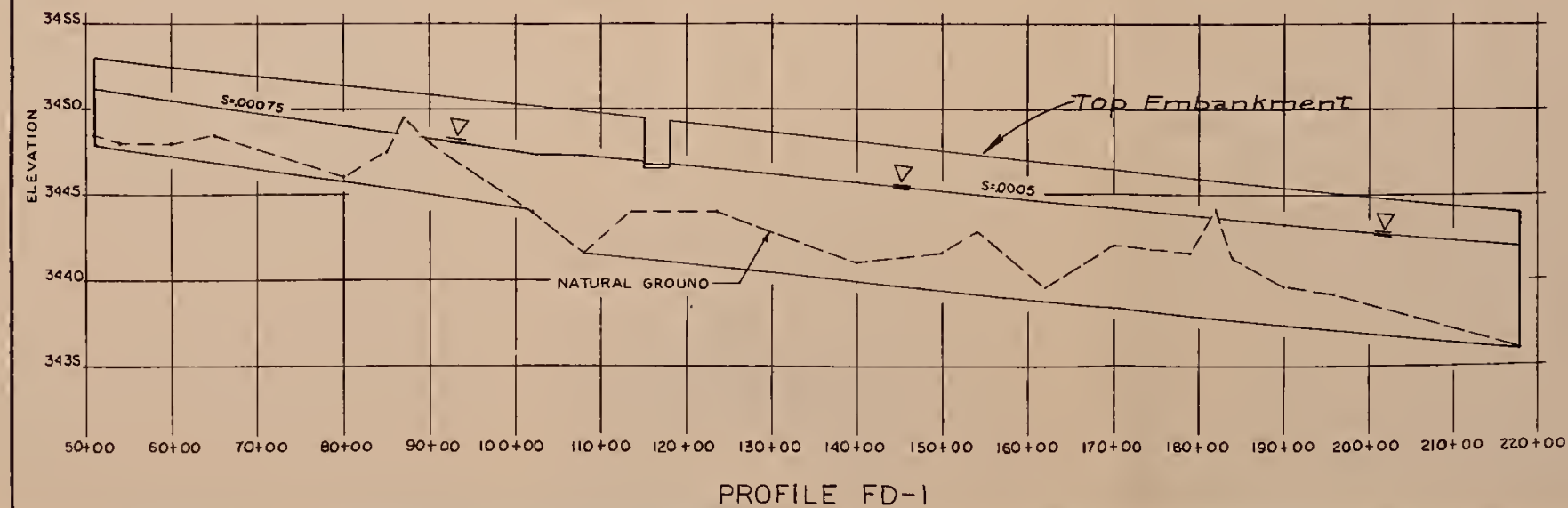
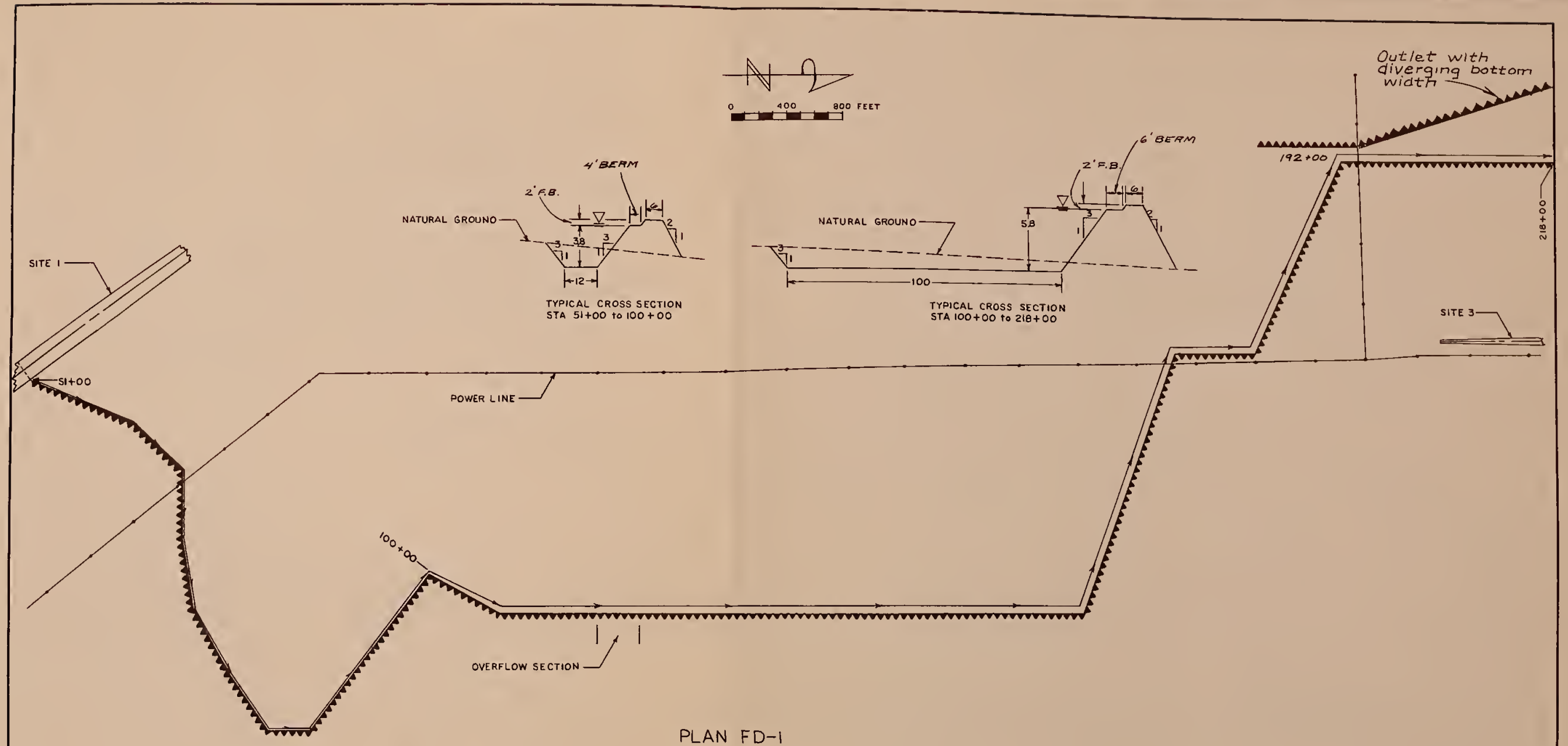
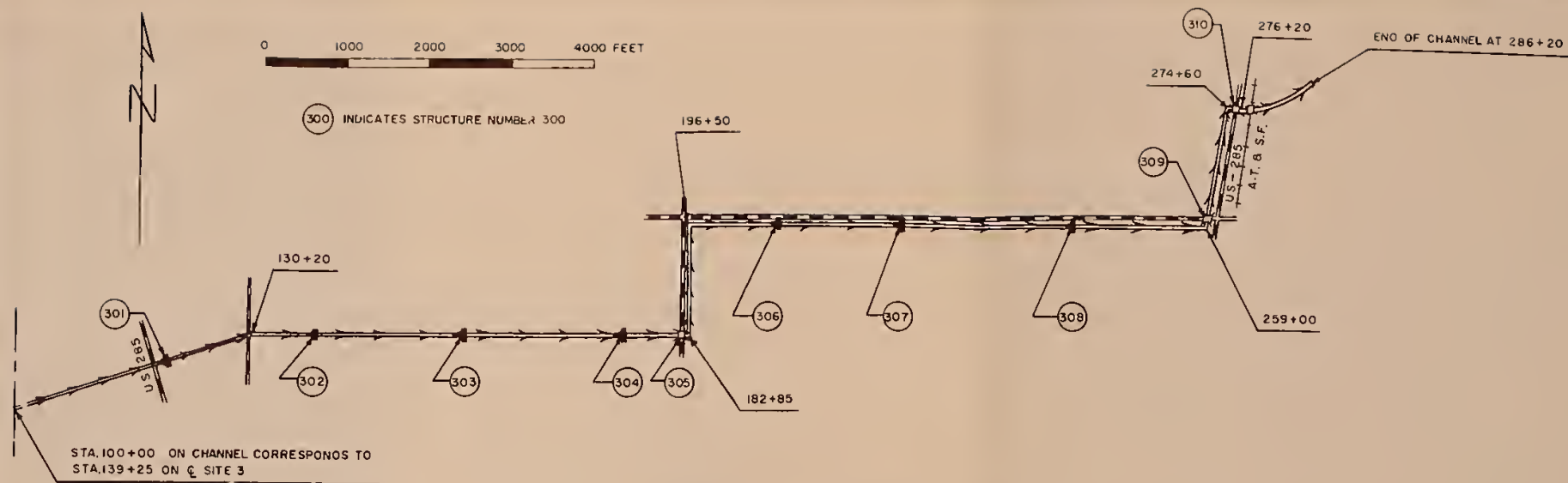
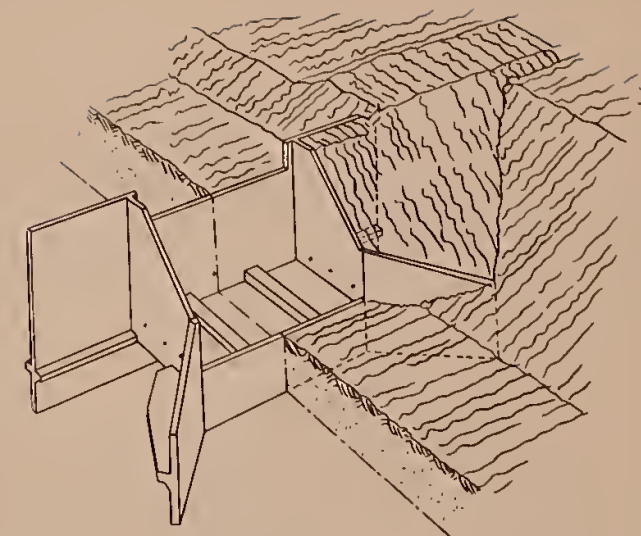


FIG. 5

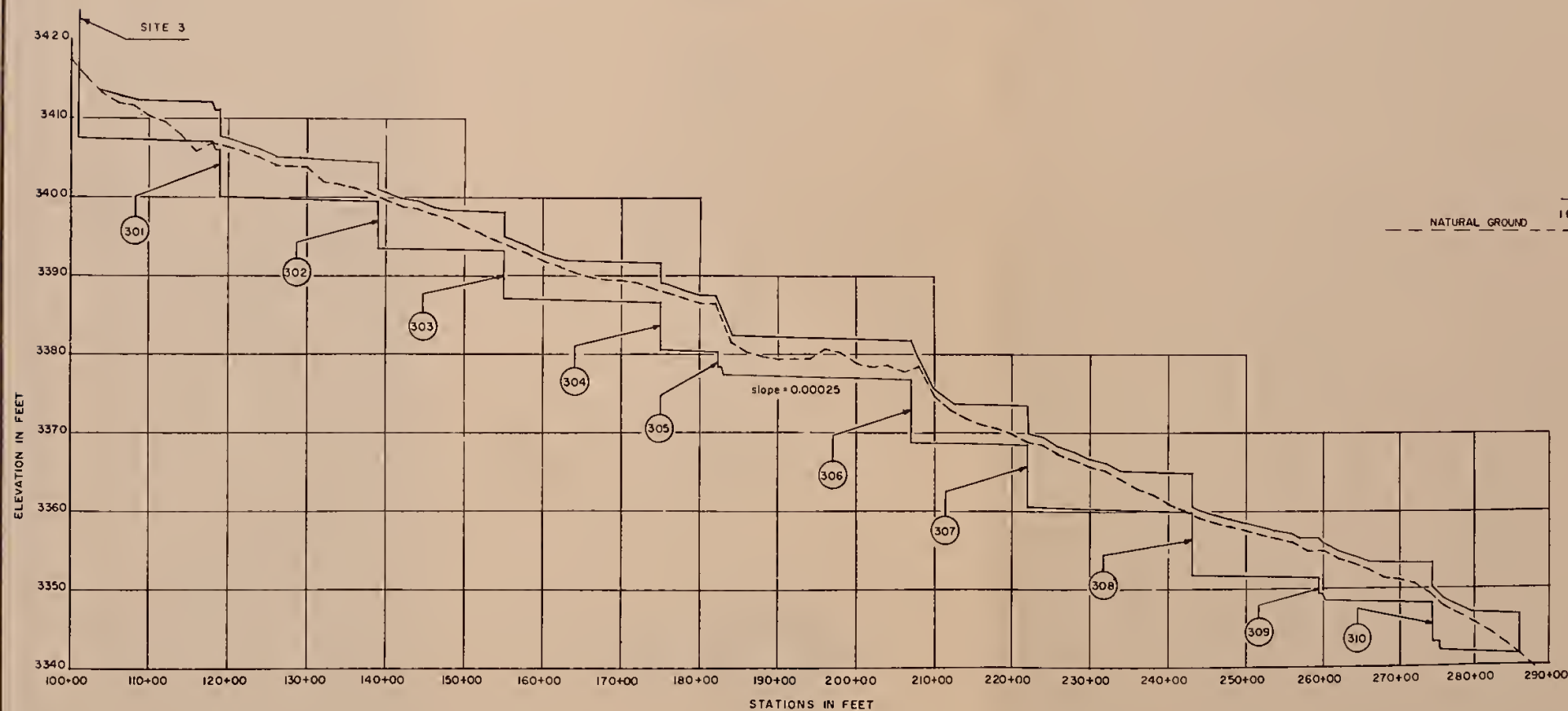
TYPICAL FLOODWATER DIVERSION			
COTTONWOOD-WALNUT CREEK WATERSHED			
EDDY & CHAVES COUNTIES, NEW MEXICO			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed <u>R. Anderson</u>	Date <u>4/60</u>	Approved by _____	Title _____
Drawn <u>R. Anderson</u>	Date <u>6/60</u>	_____	Title _____
Traced _____	Sheet _____	Drawing No. _____	
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PLAN VIEW — CHANNEL 300



PERSPECTIVE VIEW OF DROP STRUCTURE
(NOT TO SCALE)



PROFILE VIEW — CHANNEL 300

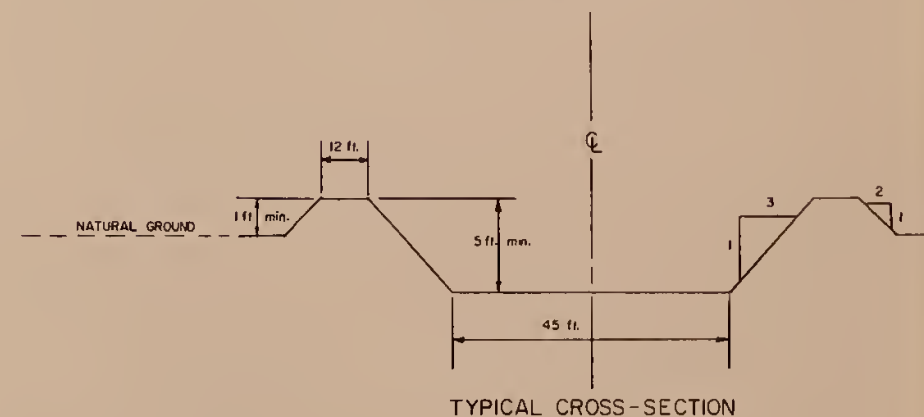


FIG. 6

TYPICAL CHANNEL			
COTTONWOOD-WALNUT CREEK WATERSHED			
EDDY & CHAVES COUNTIES, NEW MEXICO			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	WHE & RDA	Date	Approved by
Drawn	BPE	Title	
Traced	BPE	Title	
Checked	WHE & RDA	No.	Drawing No.



FIGURE 7

**COTTONWOOD-WALNUT CREEK WATERSHED
EDDY & CHAVES COUNTIES, NEW MEXICO**

JANUARY 1971





WATERSHED RESOURCES - ENVIRONMENTAL SETTING

Physical Data

The Cottonwood-Walnut Creek Watershed is located in southeastern New Mexico in parts of Chaves and Eddy Counties. Approximately 170 square miles of the watershed are in Chaves County, and 186.8 square miles are in Eddy County. The watershed has a total area of 356.8 square miles (228,326 acres).

The estimated population of the watershed is 650, which is essentially rural. Artesia--which adjoins the lower south side of the watershed--is the primary trade center with a population of 10,300. Thirty miles to the north is Roswell with a population of 34,000, and 36 miles to the south is Carlsbad with a population of 21,300.

The watershed is located in the Rio Grande Water Resource Region.^{1/} The Rio Grande rises in the mountains of southern Colorado and flows south, across New Mexico, into Texas at El Paso. From El Paso to the Gulf of Mexico--700 airline miles and 1,244 river miles--it forms the boundary between the United States and Mexico.

The principal tributaries of the Rio Grande are the Conejos River and Alamosa Creek in Colorado; the Rio Chama, Jemez River, and Rio Puerco in New Mexico; the Pecos River in New Mexico and Texas; the Devil's River in Texas; and the Rio Conchas, Rio Salado, Rio Alamo, and Rio San Juan in Mexico. The Pecos, the longest tributary, is separated from the Rio Grande in the upper basin in New Mexico by the Sangre de Cristo Mountain Range, an extension of the Southern Rockies.

A semiarid to arid climate and low and/or erratic rainfall are characteristic of the Region. Average annual precipitation ranges from 30 inches in the high mountains and lower coastal plains to only 8 inches in the middle valley area, where most of the precipitation occurs in the form of heavy summer thunderstorms. Winters are severe in Colorado and in the high mountains of New Mexico, but generally mild throughout the lower areas.

The regional economy is based primarily on agriculture, with livestock production predominating. Manufacturing is of relatively minor importance. In parts of the basin mineral extraction is significant. Recreation, tourism, and resort trade are increasing as sources of revenue.

^{1/} The Nation's Water Resources - 1970, U.S. Water Resources Council.

The watershed is in the Upper Pecos Water Resource Subarea. This area extends from the river's headwaters in the Sangre de Cristo Mountains in San Miguel County, New Mexico, to Red Bluff Reservoir at the New Mexico-Texas state line. It includes San Miguel, Guadalupe, De Baca, Chaves, and Eddy Counties, New Mexico (Water Resource Subarea 1306 1/).

The terrain of this Subarea is rugged and mountainous in the northern sector where the headwaters of the river are located and also in the southwestern sector. The remainder of the Subarea is undulated to flat, and consists primarily of rangeland. The southern sector also includes a substantial amount of fairly level cropland.

The Pecos River is highly mineralized because great quantities of evaporites and limestone are within reach of circulating ground waters. Sediment production within this Subarea, however, is considerably less than that of the Rio Grande drainage area. The predominant water use in the Subarea is for irrigation. It is estimated this comprises 90 percent or more of the total use. In many areas withdrawals exceed recharge rates.

The watershed includes Walnut Creek, Cottonwood Creek with its north and south branches, and several smaller drainages between Artesia and Cottonwood Creek that are tributaries to Cottonwood Creek. The stream characteristics for Walnut Creek Channel and Cottonwood Creek Channel are similar. There is some variation in alignment, shape, and size. The side slopes and bottom are irregular. The gradients of the streams are approximately 65 feet in a mile for the eastern portion of the watershed. Gradients are steeper in the western or upper end of the watershed.

The course of Walnut Creek, an ephemeral stream, is entirely within Township 15 South in Chaves County. The northern boundary is approximately 7 miles north of the south Chaves County line. It heads in the foothills of the Sacramento Mountains at an elevation of 4,200 feet above mean sea level and flows eastward into the Pecos River at a point approximately 8.5 miles north of the City of Artesia. The southern boundary of Walnut Creek is the northern boundary of the Cottonwood Creek drainage. The drainage basin of Walnut Creek is approximately 26 miles long and 4.5 miles wide and encompasses 111.5 square miles. The channel, which is unmodified and well-defined, flows through irrigated cropland for a distance of about 5 miles. The gradient through the cropland is approximately 1 percent.

Cottonwood Creek, with its north and south branches and other tributaries, has a drainage basin about 30 miles long and 8 miles wide and encompasses about 245.3 square miles. Springs are a water supply source for a portion of Cottonwood Creek. These springs now have an average annual flow of less than 1 cubic foot per second. Cottonwood Creek heads in the foothills of the Sacramento Mountains at 4,500 feet above mean sea level. North Cottonwood Creek rises in Chaves

1/ Water Resource Subareas - 1970, U.S. Water Resources Council.

County and flows eastward through western Eddy County. South Cottonwood Creek and North Cottonwood Creek join together approximately 10 miles west of the Pecos River and flow through irrigated cropland between this point and Alternate Highway U.S. 285. The gradient of the channel through the irrigated cropland is approximately 1 percent. Both South Cottonwood Creek and North Cottonwood Creek are unmodified, well-defined, ephemeral streams. For a short distance below the junction of the north and south branches, Cottonwood Creek is a perennial stream with a low base flow.

The quality of ground water and the low base flow of surface water in the area of proposed Site No. 19 is quite variable. Tables in the appendix indicate chemical analysis data from published sources and recent field tests by the Soil Conservation Service.

It is noted from these data that hydrogen sulphide was analyzed from one well producing water from the San Andres Limestone. Chloride (Cl) measurements ranged from 16 to 139 parts per million (ppm) in the water produced from the Quaternary alluvium and from 15 to 20 ppm in the underlying San Andres Limestone. Total dissolved solids range from 1,026 to 1,224 parts per million in the San Andres Limestone and from 587 to 1,998 parts per million in the Quaternary age alluvium. The pH of water from the San Andres Limestone ranges from 6.9 to 8.0 in the samples tested and 8.0 in one sample from Quaternary age alluvium. Total hardness, as calcium carbonate, was 1,179 parts per million in the water from the San Andres Limestone and 2,070 in the Quaternary age alluvium. Ground water temperatures from selected wells ranged from 63 degrees to 72 degrees F. at times of measurement.

A measurement of surface water by Soil Conservation Service personnel at the small dam upstream of proposed Site No. 19 indicated that on June 22, 1966 the water temperature was 82 degrees F. and total dissolved solids were 4,200 ppm. In 1965, a bass, bluegill, and catfish population existed in the waters impounded by the small dam on Cottonwood Creek. Additional information on surface water obtained in May 1975 show the pH was 8.5 and total hardness 1,060 parts per million.

The quality of ground water and any available surface water which will be used in the recreation development at Site 19 meet the New Mexico Water Quality standards for non-body contact water sports. Ground water will be the major source of water for the recreation development.

Tributary drainages in the southeast corner of the watershed head approximately 7 miles west of Artesia, New Mexico, and flow eastward to the lower end of Cottonwood Creek. This portion of the watershed has four main ephemeral drainage systems which lie between Artesia,

New Mexico and the main channel of Cottonwood Creek. Each drainage system flows eastward through irrigated cropland. Approximately 2.26 square miles of the watershed west of Artesia drain from the Artesia, New Mexico municipal airport and flow through the north portion of the city.

The topography is mostly rolling. The upper portion is rangeland, devoted to the production of livestock. Tracts along the valleys and the lower end of the watershed are irrigated cropland. Within the project area there is a fringe of wetlands along the Pecos River. This wetland type is dominated by saltcedar, and is classified as Type 1--seasonally flooded basins and flats. There are no other wetlands within the project area.

The watershed area includes 228,326 acres, of which 24,238 acres are irrigated cropland; 195,267 acres are rangeland; and 8,821 acres are in miscellaneous use, such as farmsteads, roads, highways, railroad, and built-up areas. Approximately 68,130 acres of the watershed are federal land (public domain); 37,460 acres are New Mexico state land; and 122,736 acres are privately-owned land.

There are two soil and water resource problem areas in the watershed. The rangeland is a grassland community consisting of burro-grass (*Scleropogon brevifolius*), tobosa (*Hilaria mutica*), creosotebush (*Larrea divaricata*), and some blue grama (*Bouteloua gracillis*) on the uplands; and alkali sacaton (*Sporobolus airoides*), mesquite (*Prosopis juliflora*), and saltcedar (*Tamarix pentandra*) on the bottom lands. The primary conservation treatment needed involves proper utilization of the desirable grasses to increase production and improve range conditions. All of the cropland is irrigated. Irrigation water management is the principal conservation treatment needed, along with lining irrigation ditches and installation of irrigation pipeline.

The watershed is located in the Pecos Valley section of the Great Plains Physiographic Province. ^{1/} The area of the upper 14 miles of Cottonwood Creek and the upper 3 miles of Walnut Creek is underlain by San Andres Limestone of Permian age. Both streams, for the next 8 miles, are in the outcrop of the Artesia Group of Permian age. The Artesia Group, which overlies the San Andres Limestone, consists of hard limestone and dolomite, red sandstone, shales, siltstones, and gypsum.

The lower reaches of the watershed are underlain by recent valley fill and older alluvium. The older alluvium consists of indurated red sandstone, siltstone, shale, and pebble conglomerate. This material that overlies the Artesia Group is as much as 300

^{1/} Physiography of Western United States, Fenneman, (NM) 1931.

feet thick. ^{1/} The horizontal and vertical bedding planes of these units are irregularly distributed. The attitude varies from steeply dipping to flat.

The primary source of water for domestic livestock and irrigation use is artesian and shallow wells. The principal aquifers are the San Andres Limestone, the Artesia Group, and the overlying Quaternary age alluvium. Minor quantities of irrigation water are obtained by diversions of seasonal streamflow. Water from both underground and surface sources is fully appropriated and adjudicated by the courts.

Thickness and type of flow of the principal aquifers are: San Andres Formation, 1,000 feet--the source of artesian supply; Artesia Formation, 600-900 feet--the source of some artesian supply; and Quaternary alluvium, up to 300 feet--the source of shallow water supply. ^{1/} The shallow wells are locally limited in supply due to the lenticular nature of the water-bearing formations.

Recharge of these aquifers occurs for the most part in the San Andres outcrop area. This area extends from the uppermost portions of the watershed westward to the crest of the Sacramento Mountains. The overlying Artesia Formation and Quaternary alluvium are primarily recharged by the upward percolation of the artesian waters of the San Andres Formation. Some recharge occurs in the limited outcrop area of the Artesia Formation, principally along the stream channels.

Soils in the watershed are generally shallow and rocky in the west or upper end of the watershed and deep and loamy in the east or lower end.

There are five major range sites in the watershed. These are: Salty Bottom Lands in a band one to four miles wide along the Pecos River; Bottom Lands scattered throughout the watershed on Pima soils along the drainage ways; Loamy on the dominant range site in complex with the Shallow sites in a large area of Reagan-Upton soils in the middle part of the watershed; Shallow occurring in a large area in the upper part of the watershed and as the dominant range site in complex with Loamy sites in the Upton-Reagan soil association of the north middle part of the watershed; and Limestone Hills in the western part of the watershed.

^{1/} Geology and Ground Water Resources of Eddy County, New Mexico, State Bureau of Mines & Mineral Resources, Ground Water Paper No. 3, 1962.

Climax vegetation on these sites is principally black grama (*Bouteloua eriopoda*), blue grama (*Bouteloua gracilis*) and sideoats grama grasses (*Bouteloua curtipendula*); winterfat (*Eurotia lanata*) with four-winged saltbush (*Atriplex canescens*) on the loamy and bottom land sites; and alkali sacaton (*Sporobolus airoides*) and giant sacaton (*Sporobolus wrightii*) and vine-mesquite (*Panicum obtusum*) grasses on the bottom land sites. When deterioration of the sites occurs, the predominant invading species are burrograss (*Scleropogon brevifolius*) and creosotebush (*Larrea divaricata*) on the upland and loamy sites; and tobosa grass (*Hilaria mutica*), catclaw (*Mimosa biuncifera*), Apacheplume (*Fallugia paradoxa*), saltcedar (*Tamarix pentandra*), and mesquite (*Prosopis juliflora*) on the bottom land.

Known mineral resources within the watershed at the present time are two producing gas and oil wells. There are no known metallic minerals in the area. Caliche pits are opened as needed for road construction, but are not permanent installations.

Average annual precipitation is 11.75 inches as derived from precipitation records at Artesia. Most of the precipitation falls as high-intensity rain during thunderstorms of comparatively short duration. Extremes in precipitation range from a low of 3.97 inches in 1917 to a high of 36.31 inches in 1941.^{1/}

The climate is dry and moderately hot, with a mean average annual temperature of 60.8 degrees F. The extreme temperatures range from a low of minus 35 degrees F. to a high of 111 degrees F. The average frost-free period is 196 days, generally extending from April 14 to October 17.^{1/}

Economic Data

Present land use is as follows:

Land Use	Private	State	Bureau of Land Management	Total	Percent
Irrigated Cropland	24,238	--	--	24,238	10.6
Rangeland	91,916	36,701	66,650	195,267	85.5
Miscellaneous ^{2/}	6,582	759	1,480	8,821	3.9
TOTAL	122,736	37,460	68,130	228,326	100.0
Percent	53.8	16.4	29.8	100	

^{1/} U.S. Weather Bureau.

^{2/} Includes lands for residential areas, roads, highways, irrigation facilities, and idle land.

The irrigated cropland is divided into 112 operating units that range in size from 80 acres to 1,000 acres. The typical size of farm units in the irrigated portion of the watershed is 320 acres. The principal crops grown on irrigated land are cotton and alfalfa, 35 and 52 percent, respectively. Annual crop production averages about two bales per acre for cotton and six tons of hay per acre for alfalfa. Other crops grown are corn, grain, sorghums, small grains, and miscellaneous vegetables. Most of the farm owners also raise livestock.

There are 18 ranches in the area, with an average size of 11,000 acres. The rangeland is used for both cattle and sheep production. Some cattle-feeding operations now in existence show promise for considerable development in the future. That would increase the demand for growing more feed grains and ensilage crops. An increase in acreage devoted to vegetable production is probable in the near future.

The value of agricultural land ranges from \$35 to \$1,000 per acre. Rangeland in the upland areas is considered to be worth \$35 to \$200 per acre, while irrigated cropland in the lower end of the watershed is worth \$800 to \$1,000 per acre. Approximately 64 percent of the farms and ranches in the watershed contain land that is located on the floodplain.

Cottonwood Creek surface water rights were adjudicated in 1934. Ground water rights in the Roswell-Artesian Basin were adjudicated in 1966.

The lower reaches of the watershed are crossed from north to south by U.S. Highway 285 and Alternate U.S. Highway 285. The Atchison, Topeka, and Santa Fe (AT&SF) Railroad also traverses the lower reach of the watershed. State Road 13, better known as the "Y.O. Crossing Road", crosses the upper limits of the watershed and coincides with the upper watershed boundary. The lower half of the watershed, which includes the irrigated cropland, is well served by state and county roads.

The median family income presently averages \$7,541 for the two county areas in which the watershed is located. This compares to the state average of \$7,849. 1/

1/ 1970 Bureau of the Census Data, "General Social and Economic Characteristics".

The major sources of income in the two counties in which the 1/ watershed is located are distributed approximately as follows:

<u>Sources of Income</u>	<u>Percent</u>
Wages and Salaries	58
Business and Professional	7
Agriculture	10
Property	15
Other Miscellaneous Income	10

The average percent of unemployed workers in Chaves and Eddy Counties increased from 4.1 to 6.4 percent in the period from 1961 to 1971. During this same period, the unemployment rate for New Mexico declined from 6.4 to 4.8 in 1969 and then increased to 6.4 percent by 1971.2/ At the same time, the number of workers declined in six of the 10 sectors of the economy. These six sectors were agriculture; construction; wholesale and retail trades; mining; transportation, utilities, and communications; and finance, insurance, and real estate.2/

Fish and Wildlife Resources

Fishery resources are extremely limited within the project area. The middle reach of Cottonwood Creek is a perennial stream with low sustaining flows. A single farm pond impoundment on the creek supports a fishery of warm water species. In addition, the Pecos River, bordering the project area, supports a warm water fishery.

Wildlife resources include four distinct habitat types which are associated with land uses and riparian influences. These are:

1. The rangeland habitats of the Southern Desert resource area that support low density populations of mule deer, antelope, jack rabbit, coyote, scaled quail, small mammals, reptiles, and associated songbirds.
2. The habitats associated with perennial and ephemeral water-courses which traverse the rangelands. These habitats also support the wildlife species of the rangeland types, and in addition, support ringneck and whitewing pheasant, cottontail rabbit, mink, skunk, raccoon, several amphibians, shorebirds, mourning doves, and tree nesting songbirds. Field investigations indicate that on the 9.7 miles of natural and new drainageways where construction is planned, there is no high quality wildlife habitat in Channel 500, 200 feet of high quality wildlife habitat in Channel 300. On Walnut Creek there are 4,550 feet of high quality wildlife habitat that will not be affected by project installation and 5,800 feet of high quality

1/ N.Mex Statistical Abstract, 1970, Bureau of Business Research, University of New Mexico.

2/ Employment Security Commission of New Mexico.

habitat in the Cottonwood Creek Channel.

Eleven floodwater retarding structure sites and one multi-purpose structure site (Site 19) occur within this habitat type. Examination of the sites indicates that four of the floodwater retarding structure sites (Sites 4, 6, 7, 8) and Site 19 contain existing habitats of high quality.

3. The cropland habitats are located on areas of relatively flat soils and are crossed by the natural drainageways. Depending upon the crop being grown, these habitats may be important winter feeding areas for large numbers of migratory sandhill cranes, ducks, and geese. Other wildlife species which utilize the cropland habitats include the ringneck and whitewing pheasant; mourning doves; blackbirds and other flocking, ground feeding birds; cottontail rabbits, small mammals; and ground nesting songbirds. The woody vegetation growing along the natural drainageways provides important roosting, nesting, and escape cover within this cropland habitat.
4. The salty bottom land range site that occurs along the Pecos River provides another distinct habitat type which supports most of the species found in the other habitats. This bottom land habitat type contains remnant stands of saltcedar that once vegetated a much larger area. The saltcedar vegetation provides a heavily used nesting area, with production of up to 22 mourning dove per acre reported for the project area. This habitat provides open water during the winter months, which is heavily utilized as resting areas by migratory waterfowl.

There are no known sources of pollution that affect fish and wildlife resources.

Public access is largely available over most of the rangeland habitat, the upper portions of the natural drainageway habitats, and the bottom land habitats. A private hunting association controls access to the cropland habitats and the portions of the lower drainageway habitats which cross the croplands.

Populations of ringneck and whitewing pheasants are the result of releases of pen-reared birds. Maintenance releases are required to support a significant huntable population.

Wintering populations of cranes and waterfowl represent an important wildlife resource. The role of private lands, such as the bottom land and cropland habitats, is to provide important feeding areas which complement those provided by managed waterfowl refuges on the Pecos River.

The tree vegetation of the drainageways and bottom land habitats provides important nesting sites for mourning doves. As other areas of suitable nesting sites up and down the river are reduced or eliminated by planned water salvage projects and new impoundment construction, the importance of the remaining tree vegetation will increase.

The rangeland habitat type found within the project area does not represent any qualities of particular significance. Wildlife populations are not large, and are similar to populations occurring over a very large land area in this part of the state.

Recreational Resources

Within or nearby the city of Artesia there are two city parks, three golf courses, two hunting preserves, one water sports area, and numerous horse riding facilities. The 1971 Outdoor Recreation Comprehensive Plan for New Mexico indicates that there are 188,273 acres of public recreation lands in Eddy County. In Planning and Development District No. 6, where Artesia is centrally located, the major recreation needs were delineated as: tennis courts, developed parks, picnic areas, and boating areas. The report indicates that a five-year acquisition and development schedule will provide: an 18-hole golf course at Carlsbad, a regional park and lake at Hobbs, a state park and lake at Artesia, a wilderness area at Carlsbad, expansion of a city park at Carlsbad, picnic and campground facilities in Lincoln National Forest, picnic facilities and scenic drive expansion at White Sands National Monument, and a proposed Pecos River Trail system.

Existing public and private recreation facilities in Planning and Development District No. 6 have been identified and are as follows:

1. Picnic units	1,017
2. Swimming pools and beaches	67
3. Acres of land intended for hunting	6,320
4. Acres of water surface of lakes for fishing and recreation	6,733
5. Miles of fishing streams	54
6. Number of boat accesses to lakes	4
7. Available boat moorings	40
8. Miles of trails	27

None of these facilities are in the watershed. A few of the picnic units are located nearby in Artesia's community park. There is a current shortage of facilities for most types of recreational activities within Planning District No. 6.

The future potential of recreation by 1990 in the area of the watershed is indicated by the change in demand for the 10 most popular current activities.^{1/} These changes are shown in the following table according to the popularity of the activity:

<u>Activity</u>	<u>Percent Currently Engaging in This Activity</u>	<u>Percent Change In Demand 1970-1990</u>
1. Pleasure driving	63	+ 72
2. Picnicking	62	+ 74
3. Walking for pleasure	58	+ 84
4. Attending outdoor sporting events	54	+ 66
5. Fishing	53	+ 45
6. Car sightseeing	52	+ 75
7. Pool swimming	45	+ 84
8. Hunting	40	- 1
9. Bicycling	37	+ 44
10. Horseback riding	27	+ 74

The limited recreational resources in the area are fully utilized and oftentimes crowded since they are confined to the facilities existing in the community park at Artesia. These facilities consist primarily of golfing and picnicking.

There are no known sources of pollution that affect recreational resources.

Archeological and Historical Values and Unique Scenic Areas^{2/}

"The Museum of New Mexico had no record in its archeological survey catalog of earlier surveys in the Cottonwood-Walnut Drainage. This fact, plus the relatively small area covered by the survey, made it impossible to predict the frequency and variability of cultural remains in the area. This problem was further compounded by the proximity of the survey localities to areas of intensive agriculture and settlement. A significant percentage of the survey area was either currently under cultivation, or had been in the past, thereby rendering the archeological inventory incomplete.

"Approximately seven square miles were covered by the survey. All areas were repeatedly traversed on foot to locate any cultural remains--i.e., pottery fragments (sherds) and chipped or ground

^{1/} Outdoor Recreation - A Comprehensive Plan for New Mexico - 1971.

^{2/} An Inventory of Archaeological and Historical Remains in the Cottonwood-Walnut Drainage, Chaves and Eddy Counties, New Mexico - August 1974. (Museum of New Mexico.)

stone tool debris (debitage) are indicators of archeological sites; broken glass, crockery, metal, and factory-made items for sites of the historic period. Concentrations of sherds or debitage (or lithic scatter) were considered as archeological sites. #...# It was decided to disregard most historic refuse areas if they were not associated with the remains of some sort of a structure or dwelling. This procedure excluded from consideration most historic materials dating more recently than the mid-1930's, but included sites dating from the late nineteenth century onward to the third decade of the twentieth century.

"A total of 14 archeological/historical sites were located and recorded. Of these, four were manifestations of the Jornada Branch of the Mogollon Culture. The remaining 10 sites were homesteads of the historic Anglo period, probably constructed after the arrival of the railroads in the late 1800's.

"The major population centers of the Jornada Branch of the Mogollon Culture are located in the Sacramento Mountains, the Tularosa Basin, the Jornada del Muerto, and lower Rio Grande Valley. The sites encountered on the Cottonwood-Walnut survey constitute extensions of the Jornada Branch into the extreme eastern periphery of the sedentary, agricultural Mogollon Culture, except for some local manifestations in the southeastern corner of New Mexico. Judging from the types of sites encountered on the survey, the Jornada sites were relatively impermanent, probably seasonal, occupations. Conceivably, they may not be sites of Jornada people at all, and may have been entirely different people who merely obtained Jornada pottery by trade with settlements to the north or west. Of all the sites encountered on the survey, the Jornada sites--if that is what they are, offer the greatest potential for obtaining valuable information concerning the prehistoric occupants of the southern Pecos Valley.

"Although they were certainly in the general area during the late prehistoric and much of the historic period, the various Apache and other Plains Indian groups apparently did not use the survey localities for anything but passing through.

"None of the sites recorded warrant being listed on either National or State Registers of significant sites, at least not in terms of their being exceptional examples of architecture, homes of important persons, locations of important events in the history of the State or Nation, or major settlements of prehistoric Indians. However, further investigation of at least some of the sites is warranted so that when construction of the needed flood control structures begins, some record of the contents of the earliest prehistoric and the earliest historic settlements in the area will have been made.

"In terms of mitigating what might be considered an adverse impact on the historic period sites, little can be recommended other than conducting excavations of several of the dugouts and associated structures and refuse. Relocation of the flood control structures is not warranted. The same can be said for the prehistoric sites. The prehistoric sites do not compare with the large pueblos of western New Mexico, but they are important in terms of their being among the easternmost of the settlements of the sedentary Jornada Branch of the Mogollon Culture, and their contents should be investigated. By 'investigated' it must be understood that this means careful excavation and recording by qualified professional archeologists assisted by amateur archeologists or unskilled labor under direct supervision by the professional archeologist. Materials and data from such excavations should be deposited in an educational institution or museum where they may be properly stored and cared for, and be available for examination by the archeologists and the general public.

"Although many of the historic sites listed in the inventory are recommended for excavation, test excavations may indicate that further digging is unnecessary. Some sites may need only a few trenches to collect a sample of associated artifacts and data; others may be found to warrant more complete excavation."

The National Register of Historic Places was consulted. No cultural sites in the watershed are listed in the National Register of Historic Places.

Soil, Water, and Plant Management Status

There has been little change in land use, and this trend or lack of change will probably continue for the following reasons: (1) All irrigation water is appropriated so no more land will go into cultivation; and (2) there are little or no factors of production committed to marginal or sub-marginal areas.

Activities of the Central Valley, Hagerman-Dexter, and Penasco Natural Resource Conservation Districts include working with individual farmers and ranchers to develop basic conservation plans with emphasis on proper range use and irrigation water management. The districts also assist local units of government to promote proper land use, provide conservation education, sponsor Public Law 566 watershed projects, and support the Sureste RC&D Project Area for resource conservation and development. Within the three natural resource conservation districts there are 130 operating farm and ranch units, of which 101 are cooperators and 80 have basic conservation plans. Approximately 89 percent of the watershed area is covered by district agreements, and 65 percent of the planned practices are presently applied.

Assistance from the Great Plains Conservation Program, New Mexico Extension Service, Bureau of Land Management, Agricultural Stabilization and Conservation Service, New Mexico State Land Office, and others has been excellent.

WATER AND RELATED LAND RESOURCES PROBLEMS

LAND TREATMENT

A declining water table during the last decade and the resulting limitations on irrigation water are the most serious problems facing irrigation farmers. Coping with these problems requires efficient use of irrigation water and the possibility of growing crops that use less water. Leveling land, lining ditches, and installing irrigation pipelines will provide facilities for more efficient irrigation.

Rangeland that has been depleted of desirable forage species is a problem on some ranches near the Pecos River. Economic returns for range improvement are small and prolonged because of the slow rate at which range conditions improve in this climatic zone.

Ranchers have been reluctant to invest the time and sacrifice the current income necessary to achieve improved range conditions through deferred grazing. Range seeding trials in this location generally have been unsuccessful in re-establishing stands of climax type vegetation. Additional fences and water developments are needed to obtain better livestock distribution and to initiate improved grazing systems.

FLOODWATER DAMAGE

The watershed area consists of two main areas with a history of flooding. These areas include the Walnut Creek drainage and Cottonwood Creek drainage.

Floods are principally caused by local short-duration, high-intensity thunderstorms covering a few square miles. These floods characteristically have high peak flows, small volumes, and occur during the summer and early fall months. General storms over all or most of the watershed with comparatively long durations do occur. Floods from this source have large volumes and may have peaks exceeding those from local thunderstorms. Damaging floods occurred in 1915, 1937, 1941, 1954, 1960, 1962, 1964, 1965, 1966, and 1967. Five or six damaging floods were reported in 1941. Based on available records, it appears that the largest flood in 1941, and the 1954, 1964, and 1965 floods would have an expected chance of occurrence of once in every 50 to 100 years.

Floods damage crops, irrigated land, irrigation facilities, roads, highways, farm buildings, farm improvements and equipment, and the railroad. An additional damage mentioned by several landowners was the spreading of weed seeds by the floodwater. The succeeding weed crops have caused considerable additional expense in cultivation and eradication.

Floodwater and sediment damage from the Walnut Creek drainage occurs adjacent to, and in a band along the main channel and tributaries north of the main channel through the irrigated cropland. This area of damage begins about four miles west of Alternate U.S. Highway 285 and extends to the Pecos River. Damages begin from a storm having a 50 percent chance of occurrence.

Floodwater and sediment damage from the Cottonwood Creek drainage occurs adjacent to and in a band along the main channel through the irrigated cropland. This area of damage begins approximately three miles above the point where South Cottonwood Creek and North Cottonwood Creek come together and extends to the Pecos River. The runoff from drainages west and north of Artesia cause floodwater and sediment damage to irrigated cropland along the main channels of each drainage before entering the floodplain of Cottonwood Creek. Flood flows from the tributary drainage west of Artesia enter the north end of the city causing floodwater and sediment damage to urban property. Damage begins from a storm having a 70 percent chance of occurrence.

The most damaging flood on record was in October 1954. This flood caused an estimated damage of \$275,000 (1954 prices). This flood inundated about 3,600 acres of cropland. Crop damage was estimated at \$185,000. This crop damage included the loss of 1,000 bales of cotton, 250 tons of alfalfa, and the lowering of the grades and quality of cotton and alfalfa that was not actually destroyed. Approximately 550 head of sheep, several hogs, and some poultry were drowned. Estimated loss of livestock and poultry was \$9,500. About 400 acres of irrigated land damaged from the 1954 storm had to be releveled. Cost of releveled and smoothing this land was about \$12,000.

Traffic was delayed on Alternate U.S. Highway 285, on State Roads 350 and 351, and on county roads. Some damage occurred to paved and gravel-surfaced roads. The Atchison, Topeka, and Santa Fe (AT&SF) Railroad was damaged, and some delay in traffic occurred.

In 1964, a storm west and north of Artesia on Cottonwood Creek tributaries caused flood damages of \$184,000 and inundated about 1,900 acres. The 1965 flood on Walnut Creek caused an estimated \$163,000 in damages and inundated 1,400 acres (1964 and 1965 prices).

Average annual direct damage from floodwater and sediment in the watershed is estimated to be \$278,400 under future conditions without the project. This estimate is based on more intensive use of irrigated land and higher value crops. Other flood damage,

which occurs outside the watershed--from flood runoff in the watershed--amounts to an estimated \$187,300 average annual damage to urban property in the north end of Artesia.

Indirect damage from flooding in the watershed results from interrupted use of farm labor, delays and detours on roads made impassable, and loss of income from regular employment for the time required to repair flood damage. Indirect damage averages \$28,000 per year in the watershed.

EROSION DAMAGE

Soil erosion is relatively low. The average annual gross erosion rate is estimated at 1.25 tons per acre. Of this amount it is estimated that sheet erosion accounts for 85 percent of the damaging sediment, and minor gullying and streambank erosion accounts for the remaining 15 percent.

SEDIMENT DAMAGE

The damage to crops and pasture from sediment deposition is relatively small. There is some damage due to the lowering of grades and quality of crops, but this has been accounted for in the floodwater damage appraisal. The estimated average annual yield of sediment to the floodplain or damage area is approximately 151,703 tons per year.

The estimated average annual sediment yield to the Pecos River, under future conditions without the project, is 22,645 tons. Concentration of sediment in the total water yield to the Pecos River is estimated at 9,136 milligrams per liter. Some of the sediment will remain in the river channel and some will be deposited in Lake McMillan, approximately 20 miles below the watershed on the Pecos River. Dollar estimates of sediment damage were not segregated from floodwater damage.

DRAINAGE

Adequate drainage facilities have been installed, and with proper maintenance of these facilities drainage is not a problem.

IRRIGATION

The present irrigated area is on deep, highly productive soils. There is no potential for increasing the acreage because ground and surface water is fully appropriated. There can be some transfer of water rights, but no increase. Cropland is irrigated from wells at an average rate of 3.0 acre-feet of water applied annually for each water-right acre. Because of a carriage loss of two inches per acre-foot of water-rights, pumping could be increased to a total of 3.5 acre-feet per acre measured at the

well. A small acreage on Cottonwood Creek has surface water-rights. There is no surplus water now nor is any anticipated in the foreseeable future. Existing irrigation systems are generally adequate but need conservation practices that will save water in transit as well as provide for more efficient irrigation water management. Phreatophyte control (saltcedar) has been initiated by the Bureau of Reclamation on the Pecos River as a water salvage project.

MUNICIPAL AND INDUSTRIAL WATER

There is no municipality (city, town, or village) within the watershed project area. There may be some population growth within the project area, but there is adequate water for this small growth. If light industry is located in this area, which includes feedlot operations, water rights can be purchased and transferred to this type of enterprise.

RECREATION

Water quality and sediment problems have no serious influence on potential recreation resources within the project area. There is an overall lack of water-related recreational facilities in this area due to the desert climate that prevails over most of southeast New Mexico.

Water-based recreation within the immediate area of the watershed is extremely limited in relation to the population and apparent need. McMillan Reservoir, located 20 miles south of the watershed, is an irrigation reservoir which is sometimes dry or very low and is not well suited for fish production. It has limited use for swimming, water skiing, boating and camping, but no developments or improvements have been made for these purposes at the reservoir.

Present population within a reasonable distance of the watershed is 144,000. The future projected population is expected to reach 200,000 by the year 2000.^{1/} Local interest in developing additional resources is extremely keen, and for this reason a water-based recreational area was made a part of this project.

State and local planning agencies have indicated that additional water-based recreational opportunities are needed in southeastern New Mexico. The 1971 Statewide Comprehensive Outdoor Recreation Plan indicates that for the planning area in which the project is centrally located, major needs are: tennis courts, developed parks, picnic areas, and boating and fishing areas.

^{1/} Extracted from New Mexico Bureau of Business Research - August 1972.

FISH AND WILDLIFE

Maintenance of phreatophyte control project areas, or the expansion of such project areas, will remove tree vegetation, which is important as wildlife habitats. The natural type of habitat along drainageways is periodically flooded, resulting in the destruction of herbaceous and woody vegetation growing in the channel. Following these floods, the channels are often cleaned to remove sediments and debris. Both of these occurrences have the effect of destroying food and cover-producing vegetation which sustains wildlife populations.

The southeastern portion of the state is generally deficient in bodies of water which can be managed for fishing. The area is also deficient in water areas, near croplands, which will provide resting areas for migratory waterfowl during the winter months. The cropland portion of the project area is deficient in providing sufficient winter cover for increases in the pheasant populations.

There are no endangered wildlife species which are resident within the project area. While the ancestral range of the Pecos gambusia (*Gambusia nobolis*) included this general part of the Pecos River drainage, this endangered species presently does not occur within the project area.1/

ECONOMIC AND SOCIAL

The gross income of an average irrigated farm in Chaves and Eddy Counties is presently estimated to be \$25,000 per year, and a ranch will gross an estimated \$18,000.

Approximately 9 percent of the family-type irrigated farms in the watershed have a gross income of less than \$10,000; 21 percent gross \$10,000 to \$20,000; and 14 percent gross \$20,000 to \$25,000 per year. The typical ranch in the watershed grosses approximately \$16,000.

The median family income presently averages \$7,541 for the two-county area in which the watershed is located. This compares to the state average of \$7,849 and a \$6,438 average for the subarea.2/

The percent of families now living below the poverty level averages 19.1 percent for Chaves and Eddy Counties, compared with an average of 18.5 percent for the State of New Mexico and 27.9 percent for the Upper Pecos subarea.2/

1/ "Threatened Wildlife of the United States", 1973 Edition, U.S. Fish & Wildlife Service, and "Endangered Non-game Fishes of the Upper Rio Grande Basin", Clark Hubbs and A. E. Echelle, in proceedings of the Symposium on Rare and Endangered Wildlife of the Southwestern United States, held September 22-23, 1972, Albuquerque, NM.

2/ 1970 Bureau of the Census Data - "General Social and Economic Characteristics".

The average percent of unemployed workers in Chaves and Eddy Counties increased from 4.1 to 6.4 percent in the period from 1961 to 1971. The unemployment rate for the subarea was 6.0 percent in 1971. During the same period the unemployment rate for New Mexico declined from 6.4 to 4.8 in 1969 and then increased to 6.4 percent by 1971. At the same time, employment in the two counties declined in 7 of the 10 major sectors of industry, including agriculture.^{1/}

A further indication of the level of the economy in this area is that Chaves County is included in the Four Corners Development Area. Eddy County is presently designated by the Economic Development Administration as being an area of chronic unemployment and under-employment (Title IV, P.L. 89-136).

There is a particular need for employment in the construction sector of the two-county area. From 1961 to 1971 the number employed in construction work declined approximately 69 percent. The remaining six sectors which have had a decline in the number employed also need new employment opportunities. These six sectors include:

1. Wholesale and retail trades
2. Mining
3. Transportation, Utilities, Communications
4. Finance, Insurance, Real Estate
5. Agriculture
6. Other minor sectors

From an estimate of the farms and ranches in the watershed, approximately 7 percent of the private agricultural land is devoted to farms utilizing 1-1/2 man-years or more of hired labor. The remaining 115,000 acres of private farm and ranch land in the watershed is devoted to farms considered to be family-type operations.

There is a need to promote rural community development within the watershed and surrounding area. This is indicated by:

1. Approximately 35 percent of the family-type farms in the watershed gross less than the average family-type operation in Chaves and Eddy Counties.
2. The median family income in Chaves and Eddy Counties is approximately \$300 less than the state average.
3. Over 19 percent of the families in the two-county area in which the watershed is located live below the poverty level.

^{1/} Employment Security Commission of New Mexico.

4. The number of agricultural workers in Chaves and Eddy Counties has declined 14 percent over the past decade.
5. The unemployment rate in Chaves and Eddy Counties has increased steadily, by 56 percent, over the past decade.
6. Direct flood damage to agricultural property in the watershed averages \$275,200 per year.
7. Prices paid by farmers have increased 18 percent over the past 10 years which has made farm operations more costly and reduced profit margins accordingly.
8. Irrigation water has been declining over the past decade.
9. Forage is being depleted on some of the rangeland.

ENVIRONMENTAL IMPACT

Flood Prevention, Erosion and Sediment

The application of land treatment measures such as proper grazing use, deferred grazing, and installation of permanent water facilities in the uplands will increase the vigor, stand, and productivity of the forage plants, thereby protecting the soil from erosion through increased cover. This will improve range habitat for livestock and wildlife. These measures are not expected to significantly influence overall wildlife population trends.

The installation of land treatment measures such as an improved cropping system, irrigation water management, irrigation land leveling, and improvement of farm irrigation systems will help protect the soil from erosion by wind and water. These measures will maintain and improve the productivity of the soil for sustained production of food and fiber.

The structural measures included in this plan will reduce average annual floodwater and sediment damage in the watershed by about 91 percent and control runoff from 85 percent of the watershed area.

The October 1954 flood on Cottonwood Creek had a frequency equal to the one percent chance of occurrence. Areas flooded on Cottonwood Creek with and without the project are shown in the tabulation in this section (see "Summary of Irrigated Cropland Flooded").

Under present conditions, the peak flow from a flood having a one percent chance of occurrence on Cottonwood Creek is 17,700 cubic feet per second (c.f.s.) at the U.S. Highway 285 bridge under present conditions. With the project installed, the flow at this point will be reduced to 1,500 c.f.s. from the same frequency flood.

The flood of June 13, 1964, on the lower end of Cottonwood Creek, resulted in 1,896 acres of farm land being damaged, and approximately \$167,500 of urban damage. Had the project been installed, only 510 acres of farm land would have been flooded by the 1964 flood or a reduction of 73 percent in the area inundated. The damage per acre would also have been less with the project installed due to decreased depths of flooding.

Proposed structural measures will control runoff from this area by reducing the peak and depth of flooding. It is estimated that there will be no significant remaining damage in Damage Areas 1 and 4 in the north part of Artesia with the project installed. The remaining flood damage will be to roads and streets from floods up to and including the 100-year flood (one percent chance of occurrence).

From the July 29, 1965 flood, 1,388 acres of farm land were flooded along Walnut Creek and its tributaries. With the project installed the area flooded from this size flood will be reduced to 217 acres. On Walnut Creek at the Alternate U.S. Highway 285 bridge, flow from a flood having a one percent chance occurrence will be reduced from 10,200 c.f.s. to 3,400 c.f.s. with the upstream structural measures installed. The remaining damages will be to 57 acres of irrigated land immediately west of the highway.

SUMMARY OF ACRES FLOODED WITHOUT AND WITH PROJECT

Evaluation Unit	Acres Flooded by Percent Chance Flood				
<u>Cottonwood Creek</u>	<u>70%</u>	<u>50%</u>	<u>10%</u>	<u>4%</u>	<u>1%</u>
Without Project	Damage Begins	60	2,656	3,920	4,832
With Project	0	0	211	732	1,193
<u>Walnut Creek</u>					
Without Project	-	Damage Begins	1,001	1,394	1,564
With Project	-	0	48	413	522

Indirect damage such as interruption of travel, loss of time from regular employment to repair flood damage, and the general nuisance and inconvenience caused by floods will be greatly reduced.

The land use in the floodplain of the watershed is entirely agricultural other than roads, highways, and the railroad. Major crops are cotton and alfalfa. Other crops grown include sorghums, corn, small grains, and miscellaneous vegetables.

Under future conditions without the project it is estimated that the average annual agricultural land flooded will be about 1,200 acres. The estimated average annual crop loss and damage will amount to about \$237,200. With the project installed the area inundated would be reduced to approximately 100 acres with an average annual damage of \$23,900.

Without the project an estimated 151,703 tons of sediment are deposited annually in the damage area of the watershed. With the project installed sediment deposition on the floodplain will practically be eliminated. Sediment yield to the Pecos River will be reduced from 22,645 to 12,425 tons annually by the project. The concentration of sediment in water from the watershed will be reduced from 9,136 to 5,012 milligrams per liter and will result in minor improvement in water quality to the Pecos River.

Fifty farm owners and operators on about 6,000 acres of irrigated cropland will directly benefit from the project. The project will also provide protection to an urban area in Artesia which adjoins the watershed. About 630 acres of urban land with approximately 100 homes and 10 business properties will be protected from floods up to and including the one percent chance of occurrence flood. Flood damage in the urban area from floods larger than the one percent chance of occurrence flood will still occur after the project is installed. These damages were not evaluated. Agricultural damage will be reduced by about 91 percent and urban damages by about 100 percent from floods up to and including the one percent chance of occurrence floods.

The installation and operation and maintenance of the project measure will provide employment for unemployed and underemployed people in the project area. It is estimated that about 25 man-years of local labor will be used annually over the expected eight years of project installation. In addition, the operation and maintenance of project measures will provide for about three man-years of employment annually.

Fish and Wildlife and Recreation

Construction of five floodwater diversions totaling about 13.9 miles will not have any significant adverse effect on the range-land habitats on which they are planned. Construction of three channels, totaling about 9.7 miles, will have a negative impact on existing wildlife habitats within portions of two channels. Channel 300 contains 200 feet of high quality habitat, and

Cottonwood Channel contains 5,800 feet. Portions of the high quality habitat can be preserved through modifications in construction methods, i.e. - excavation of only one side of the drainageway, or by channel realignment. All wildlife habitat destroyed will be replaced with selected trees and shrubs. The lower section of the Cottonwood Channel below the Atchison, Topeka & Santa Fe (AT&SF) Railroad tracks will divert flood flows directly to the Pecos River bypassing a natural channel which now flows in a southerly direction. There are remnant stands of saltcedar along the existing southerly channel. There is sufficient ground water available to sustain this vegetation after the new channel is constructed. There will be no other wetlands affected by the project.

The reduction of flood flows in the natural drainageways below the floodwater retarding structures will prevent the washing out of naturally occurring vegetation. The prolonged release of water from floodwater retarding structures will increase the growth and distribution of vegetation in downstream drainageways. The beneficial effects of this improved food and cover will, however, be largely lost to wildlife due to grazing by livestock. There will be an insignificant acreage of rangeland habitat type destroyed in the construction of floodwater retarding structures and floodwater diversions. The effects upon wildlife using this habitat type is of little consequence. There will be no effects upon aquatic life. There are no endangered wildlife species in the project area.^{1/}

The state park and the recreation lake, with an average surface area of 120 acres, will provide for fishing, boating, hunting, picnicking, and camping. The recreation season will be year-round for most activities. The value per recreational visit has been established at \$1.50 for all activities except hunting which is valued at \$6.00.

The daily design capacity of the recreational development is approximately 750. This includes 240 fishermen, 420 picnickers, and 90 campers. The estimated annual visitations to the site is 63,970.

Public access to the recreational development will be provided on a year-round basis. The New Mexico State Park and Recreation Commission has purchased the land and water rights in connection with the development of the recreation site (Site 19 with basic recreation facilities).

^{1/} "Threatened Wildlife of the United States", 1973 Edition, U. S. Fish and Wildlife Service.

Archeological, Historical, and Unique Scenic Resources

A field investigation and evaluation has been made by the Museum of New Mexico. The report by the Museum of New Mexico lists archeological and historical sites that will be affected by installing the following works of improvement: (a) floodwater retarding structure sites 7, 8, 13B, 15; multi-purpose Site 19; and (b) floodwater diversions 2, 6, 7, and 8.

None of the archeological/historical sites warrant being listed in the National or State Registers of Historic Places. However, further investigation of at least some of the sites is warranted prior to construction of structural works of improvement. This will provide a record of the contents of early prehistoric and early historic settlements in the area.

To minimize adverse effects of project installation on archeological/historical sites, the Museum of New Mexico has recommended excavation of several identified prehistorical and historical sites. Relocation of flood prevention works of improvement is not warranted. 1/ Excavation and salvage of archeological and historical material will be done prior to construction of the watershed project. This work will be done by archeologists from the National Park Service in accordance with the Archeological and Historical Preservation Act (PL 93-291).

Economic and Social

The economic base of the area essentially consists of agriculture, mining, petroleum production, some manufacturing, services, wholesale and retail trade, transportation and public utilities, and a small amount of construction.

The 1970 per capita income within the watershed is estimated to be approximately the same as the average of Chaves and Eddy Counties or about \$2,600. This compares with the state average of \$2,848 and the national average of \$3,698. 2/

It is felt that the distribution of rural population within the watershed will remain relatively constant. With the project installed, increases in population over and above normal growth are expected to concentrate in Artesia, which is the immediate trade center for residents of the watershed.

The quality of living, particularly in the rural area of the watershed, will eventually be improved by the project. Higher farm income per farm, a feeling of security from flooding, and the ability to constantly improve the land without setbacks from flooding will create the means and desire for better farm living.

1/ An Inventory of Archeological and Historical Remains in the Cottonwood-Walnut Drainage, Chaves and Eddy Counties, New Mexico - August 1974 (Museum of New Mexico).

2/ 1971 Statistical Abstract - Personal Income, Department of Commerce.

Rural development in general would be advanced by the project. This advance will be brought about by:

- (1) Cost savings by flood prevention.
- (2) Increased efficiency of farm operations.
- (3) Higher farm income.
- (4) Greater security.
- (5) Improved rural living.
- (6) Improved aesthetic values.
- (7) Preservation of open space.
- (8) Increased tax base.
- (9) Increased farm values.
- (10) Higher quality farm products.
- (11) Improved environment for migratory waterfowl, songbirds, game birds, and mammals.

It is estimated that the project will not have major significant secondary effects on the regional economy. However, secondary benefits will be significant in the watershed and in the nearby trade area.

The efficiency of agriculture will be improved by the project. Crops could be planted with confidence at earlier dates. The possibilities of replanting will be significantly reduced, thereby saving added costs of production and releasing labor for other work.

Delayed harvesting due to flooding will be reduced, and the risk of having to harvest immature crops lessened. Fertilizer applied to the crops at planting time will not be lost due to flooding.

This project will expand the rural economic base. Direct average annual agricultural benefits of \$251,300 actually will be a form of cost savings that releases income for needed goods and supplies that could not be afforded previously. Making additional income available in this manner will in turn generate other income in the community and immediate trade area. Improved efficiency of farm operations and improved farm income due to the project will provide incentives for full utilization of farm land.

Land rights required for the installation of the structural measures are about 7,645 acres of agricultural land, of which 7,445 acres

are rangeland and 200 acres are irrigated cropland. This change in use will significantly restrict agricultural production on the 7,645 acres. In addition, about 2,400 acres of rangeland will periodically be flooded in detention pool areas of the floodwater retarding structures and along floodwater diversions. This temporary flooding will interrupt agricultural use and incidental wildlife use of these areas for limited periods of time.

The project will not adversely affect the production of minerals since other caliche deposits are available nearby. Currently, there are no active mineral production activities or facilities at any of the proposed structural measure sites. On-site field investigations indicate no significant mineral resources will be lost by installation of the project.

The floodwater retarding structures will be designed to drain within relatively short periods of time. Floodwater diversions and channels will be designed to drain without leaving shallow, stagnant water for mosquito breeding places. Site 19 will be designed to eliminate shallow water around the shorelines to the degree possible consistent with topography and design criteria.

Five P.L. 566 projects have been approved for installation in the Upper Pecos Subarea which comprises San Miguel, Guadalupe, De Baca, Chaves, and Eddy Counties. Two additional watersheds in the region or area have work plans completed. The watersheds approved and planned are independent of each other, not interrelated, and are geographically widely separated with the exception of the Cottonwood-Walnut Creek and Eagle-Tumbleweed Draw Watersheds. The total regional impact of the seven projects is difficult to assess since most of the benefits and adverse effects are localized in the watersheds and immediate trade areas.

The estimated average annual costs, average annual benefits, and the benefit-cost ratio for the structural measures are shown in attached Appendix A (Table 6 - Comparison of Benefits and Costs for Structural Measures).

Favorable Environmental Effects

- a. Reduce flooding of agricultural land by 90 percent.
- b. Reduce flooding of urban property by over 99 percent.
- c. Reduce sediment yield from the watershed to the Pecos River by 45 percent or by about 10,220 tons on an average annual basis.
- d. Reduce deposition of sediment in floodplain or damage area by approximately 151,703 tons on an average annual basis.

- e. Provide additional recreation opportunities to an estimated 144,000 persons who now live within reasonable traveling distance of the watershed.
- f. Provide a high degree of flood protection to 50 landowners and 6,000 acres of irrigated land.
- g. Provide protection from the one percent chance flood (100-year frequency) to 630 acres of urban property in the north part of Artesia, including 100 homes and 10 business establishments.
- h. Reduce average annual flood damage by \$466,900.
- i. Reduce shallow ponding of water and thereby reduce mosquito breeding areas.

Adverse Environmental Effects Which Cannot Be Avoided

- a. Commitment of about 7,445 acres of rangeland and 200 acres of cropland for project structural measures that will essentially be lost from agricultural use and production.
- b. Lower the quality of wildlife habitat temporarily on about 6,000 feet of existing channels. Planting of selected trees is planned to offset most of the loss in the quality of the wildlife habitat.
- c. Dust and noise pollution during construction which cannot be avoided.
- d. Changes in the existing landscape due to the construction of dams, floodwater diversions, and channels.
- e. Periodic flooding of 2,400 acres of rangeland in detention pools and along floodwater diversions that will temporarily interrupt agricultural use and incidental wildlife use on these areas. This adverse effect will be partially offset by increased vegetative growth on the perimeter of the pool areas because of increased moisture made available.
- f. Recovery or salvage of archeological and historic materials will disturb the identified cultural properties at floodwater retarding structure sites 7, 8, 13B and 15; site 19; and floodwater diversions 2, 6, 7, and 8.
- g. Loss of about 750 acre-feet of water annually by evaporation.

ALTERNATIVES

Land Treatment - Consideration was given to land treatment measures alone for accomplishing the objectives of the local people. These measures would provide needed protection for the watershed. Due to topography and climatic conditions, they would not provide significant

reduction in flood runoff and provide only limited reduction in sediment damage. The estimated reduction in sediment yield to the damage area or floodplain from the land treatment program would average about 8,000 tons annually. The land treatment would reduce the average annual yield of sediment to the Pecos River by about 1,200 tons. Land treatment would conserve water and land resources, increase productivity, and enhance wildlife habitat. Water quality would be improved. This alternative would cost \$2,254,500.

Land treatment, floodwater retarding structures, and floodwater diversions - The floodwater retarding structures and floodwater diversions would control the 100-year storm from the drainage area above the structures. The principal spillway flows and floodwater diversion flows could be discharged into the natural drainage channels. The vegetation or natural stream regime would not be disturbed. The retarded flows would exceed the capacity of the natural channels which would result in flooding and erosion of agricultural lands. The 100-year storm would damage about 2,000 acres, while the 10-year storm would damage about 500 acres. The costs, impacts, and benefits of the land treatment program would be realized. The structural measures for the alternative would cost about \$7,482,800. This alternative would reduce flood damage by about 80 percent.

Land treatment, channels, and floodwater diversions - This alternative included channel work and floodwater diversions to protect the urban and agricultural lands from the 100-year flood. The channels would require about 354 acres of land rights through the irrigated cropland and about 1,750 acres of land rights through rangeland. The right-of-way would average about 300 feet. About 50 miles of channel would be needed. At least four bridges would have to be enlarged and about 19 new bridges installed. Large concrete drop structures would be needed to reduce the gradient to achieve channel stability. The structural measures for this alternative would cost about \$13,240,000. The impacts and benefits of the land treatment would be realized. The sediment yield from the watershed would still be transported into the Pecos River. This alternative would reduce flood damage by about 85 percent.

Environmental impacts of the channel and floodwater diversion project without floodwater retarding structures in the watershed would be:

1. Sediment yield to the Pecos River would be increased under future conditions without the project since some sediment would be deposited in the damage area without the channel project.
2. Most of the wildlife habitat on the existing channels would be removed or destroyed by enlarging the channels to the required widths.
3. Farming operations and organizations would be disrupted by constructing the new channels.

4. Flooding potential on the Pecos River would be increased to some extent because flood flows would be directed into the river by the channels.
5. Recreation development benefits would be foregone or would have to be met in other localities.

Land treatment, flood hazard insurance, zoning, and converting agricultural floodplain lands into uses more tolerant to flooding -
These alternatives were considered and their impacts analyzed.

Flood hazard insurance for the urban area in Artesia subject to flood damage would need to include the entire floodplain within the city limits. This would include areas damaged by flooding from Eagle-Draw Watershed, as well as areas damaged by flood flows controlled by structures on the Cottonwood Creek drainage.

The estimated annual cost of flood insurance premiums to local people for the residential and commercial property located in the floodplain in the City of Artesia is \$160,000. This program or alternative would not solve the flood damage to agricultural property, roads, streets, utilities, and the railroad. Sediment yield to the Pecos River would not be reduced. The area of cropland flooded by the one percent chance flood (100-year frequency) would be about 6,396 acres, and cropland flooded by the 10 percent chance flood would be 3,657 acres.

Converting highly developed, irrigated land with irrigation systems into rangeland would create economic and social dislocations in the watershed and surrounding area. Irrigated cropland and the associated improvements have been developed over many years, primarily with private funds. The estimated capital value of approximately 6,396 acres of irrigated land in the floodplain is \$5,436,000. This acreage converted to rangeland would have an estimated capital value of about \$415,000.

Flood damage appraisal of the urban area in Artesia included the existing developments and the estimated present worth of further development over the next 20 years. Zoning would have only a limited effect in solving the flood problem because of the existing development. Future development flood damage estimates constitute about 25 percent of the total flood damage appraised in the City of Artesia for future conditions.

The effects of land treatment on sediment yield to the floodplain and Pecos River would be realized and be the same as described in the first alternative (i.e. "Land Treatment").

No project - This alternative would include the on-going land treatment program under Public Law 46 and some land treatment impacts

would be realized. However, the rate of establishment would be at a lower level than with the proposed project. Under this alternative, sediment yield to the floodplain and Pecos River would be reduced. Floodwater damage to agricultural lands and urban areas in the north part of Artesia would remain the same as it is now. Approximately 6,396 acres of irrigated cropland, 100 existing homes, and 10 business firms would be flooded by the one percent chance flood. The 10 percent chance flood would inundate about 3,657 acres of irrigated cropland and the urban area of Artesia.

This alternative would not provide flood protection to roads, streets, utilities, and the railroad. No recreational development would be provided. This alternative would result in an average annual net loss of \$109,800 in benefits to the project area (Appendix A - average annual project benefits less average annual project costs).

SHORT-TERM VS. LONG-TERM USE OF RESOURCES

No changes in land use are proposed by the project. Installation of the structural measures will require about 7,645 acres of agricultural land, primarily rangeland, which will significantly restrict its present use and productivity. The project will afford, through land treatment and flood protection by structural measures, enhanced use and increased productivity on about 20,000 acres of irrigated cropland and 140,000 acres of rangeland.

Agriculture will remain the primary source of income in the watershed. The plan provides a high degree or level of flood protection consistent with the present needs and objectives of the sponsors. Future anticipated use of floodplain lands, which are expected to remain in agricultural use, will also receive a high degree of protection. Structural measures are designed to be fully effective for 100 years and provide protection from floods up to and including the 100-year flood. The multiple-purpose structure will provide needed recreation opportunities for 100 years. Flood protection from the project after 100 years will be reduced as the sediment encroaches on the floodwater detention capacity of floodwater retarding structures.

Five Public Law 566 watershed projects have been approved for installation in the Upper Pecos River Subarea comprising San Miguel, Guadalupe, De Baca, Chaves, and Eddy Counties in New Mexico (WRC Subarea 1306). Two other watersheds, including the Cottonwood-Walnut Creek Watershed, have been approved for planning in this portion of the Pecos River drainage. A work plan has been completed on the Eagle-Tumbleweed Draw Watershed which is adjacent to this watershed. Installation of structural measures has been completed on four of the five watersheds approved for installation covering approximately 326 square miles of drainage.

The watershed projects approved and planned are independent and not interrelated, with the exception of a small, common damage area in Artesia between the Eagle-Tumbleweed Draw and the Cottonwood-Walnut Creek Watersheds. The cumulative effect on the environment from the approved and planned projects is difficult to assess since the watersheds are widely separated.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Approximately 7,645 acres of agricultural land required for the installation of structural measures is the only irrevocable land use change which will result from the project. Included in the 7,645 acres of land required for the installation of structural measures are about 7,445 acres of rangeland. The remaining 200 acres are irrigated cropland. Flooding of about 2,400 acres in detention pools and along floodwater diversions will periodically interrupt agricultural use and incidental wildlife use of these areas for limited periods. Identified archeological and historic sites in the proposed project construction areas will be disturbed or destroyed when excavated for recovery of materials and the subsequent construction of works of improvement.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

A. General

The application for assistance under P.L. 566 was filed by the sponsoring local soil and water conservation districts in 1961 on the Cottonwood-Walnut Creek Watershed. Additional local sponsors now include the Cottonwood-Walnut Watershed District, New Mexico State Park and Recreation Commission, and the New Mexico State Game and Fish Commission. The watershed was authorized for planning in June 1964.

Local and state agencies which participated in project formulation and project planning include the three soil and water conservation districts (now natural resource conservation districts), the Cottonwood-Walnut Watershed District, New Mexico State Engineer, New Mexico State Park and Recreation Commission, New Mexico Department of Game and Fish, New Mexico Commissioner of Public Lands, the Pecos Valley Conservancy District, and other private individuals and community groups. The Museum of New Mexico, through arrangements with the Soil Conservation Service, made an investigation to locate archeological and historical sites in the watershed. This was completed in August 1974 and a report made on their findings. The State Historic Preservation Officer was consulted on archeological and historic sites found in the project area. The latest Federal Register listing of the National Register of Historic Places was reviewed. None of the cultural sites in the watershed are listed in the National Register.

The Soil Conservation Service will comply with Section 106 of P.L. 89-665, Executive Order 11593, and 36 CFR 800, Procedures for the Protection of Historic and Cultural Properties.

Federal agencies which assisted the local sponsors in project formulation and planning include the Soil Conservation Service, Fish and Wildlife Service, and the Bureau of Land Management.

Between March 1964 and March 1975, approximately 24 public meetings were held concerning the formulation and actual planning of the project. In addition to local sponsors, state, and federal agency personnel, those in attendance at some of the meetings included state legislators, Artesia Chamber of Commerce representatives, Artesia city councilmen, Wildlife Conservation Association members, and others.

Local news articles, at regular intervals, informed county and area people of the problems and progress during the planning of the project.

Approximately 30 persons attended a meeting July 2, 1971, in Artesia, New Mexico to review the tentative work plan. This informal field review was for the purpose of resolving questions concerning the proposed project and to establish and review the responsibilities of local sponsors. Representatives of all the local sponsors were in attendance. Others who participated in the review included a State Senator, personnel from the New Mexico State Engineer's Office, and Soil Conservation Service representatives.

More recent meetings were held February 26, 1974, in Albuquerque with state agencies and a public meeting in Artesia on March 14, 1974, with all of the sponsoring organizations and other local interest. Updated costs and other changes, as well as cost-sharing arrangements by the local sponsors, were reviewed and agreed upon. Informal review of the work plan and preliminary draft of the environmental statement by all the local sponsors preceded the public meeting. Additional meetings with the Cottonwood-Walnut Creek Watershed District board members and other local representatives were held on October 7, 1974 and on February 10-11, 1975 to make on-site reviews of the structural measures proposed.

The draft work plan and draft environmental impact statement were reviewed at a public meeting held in Artesia, New Mexico on February 12, 1975. There were no adverse opinions expressed at the meeting relative to the proposed project.

Written comments on all review drafts have been obtained from local and state agencies and federal agencies within the state.

The following agencies were requested to review and comment on the draft statement:

Department of the Army
Department of Commerce
Department of Health, Education, and Welfare
Department of the Interior
Environmental Protection Agency
Federal Power Commission
Department of Transportation
Advisory Council on Historic Preservation
Office of Equal Opportunity, U.S. Department of Agriculture
New Mexico State Engineer (Governor's Representative)
New Mexico State Planning Office (State Clearinghouse)
New Mexico State Historic Preservation Officer
New Mexico Environmental Improvement Agency
Southeastern New Mexico Economic Development District (Area
Clearinghouse)

B. Discussion and Disposition of Each Comment on the Draft Environmental
Impact Statement

The following agencies did not comment on the draft environmental
statement:

Department of Commerce
Federal Power Commission
Office of Equal Opportunity - U.S. Department of Agriculture
Southeastern New Mexico Economic Development District

The comments received from the interagency review of the draft environ-
mental statement are stated and the response made to each comment
is as follows:

Department of the Army

Comment: We have reviewed the work plan and foresee no conflict
with any projects or current proposals of this Department.
The draft environmental impact statement is considered to
be satisfactory.

Response: Noted.

Department of Health, Education, and Welfare

Comment: The Department requested more information on the impacts
of the project on vector-borne diseases.

Response: Additional information regarding the effects of the project
on vector-borne diseases has been added to the plan on page
50 and the final statement on page 37.

Department of the Interior

Comment: The document appears to have adequately described the project's impacts on fish and wildlife resources.

Response: Noted.

Comment: Omitted from the list of adverse effects is the loss of water by evaporation. It is proposed to use ground water to supply the recreational pool at the multiple-purpose structure on Cottonwood Creek in the amount of 767 acre-feet per year to maintain a lake of 150 acres. Evaporation in the area normally exceeds 5 feet per year, hence it would be impossible to maintain a 150-acre lake at a pumpage rate of only 767 acre-feet per year.

Response: The water budget developed for the recreation pool at site 19 shows that the annual loss of water by evaporation will be about 750 acre-feet. This adverse effect of the project is listed in the final statement on page iii of the summary, and on page 38, item g, under Adverse Effects.

The water budget study shows that ground water rights for the recreation pool will support a recreation pool of approximately 120 surface acres. The preliminary planning design for the recreation pool is 150 surface acres. This additional capacity will be available when and if surface water supply from 225 acres of land with surface water rights become available.

Comment: Recent chemical analyses of water from the three artesian water wells, which are to be the supply wells at the recreational site, should be made and studied in regard to the water quality of the recreation pool.

Response: Recent samples of water from artesian wells and from the small surface water impoundment above site 19 were obtained and analyzed. This information has been added to the final statement in Appendix D, Appendix A in the plan, and discussed on page 6 of the work plan and page 14 of the environmental impact statement.

Comment: The draft statement and work plan both state that raw materials for construction of dams and other earthwork are available from sediment pool and reservoir areas and from emergency spillways. The draft statement also states that "Other mineral resources within the watershed at the present time are two producing gas and oil wells. There are no known metallic minerals in the area. Caliche pits are opened as needed for road construction but are not permanent installations." However, impacts of the project on mineral resources and operations are not described.

Response: The impact of project measures on the known mineral resources has been added to the final statement on page 37 and to the plan on page 50. There is no current mining or facilities for mining minerals installed at the proposed sites for the watershed project.

Comment: We recommend that qualified personnel examine the sites of proposed structures to determine whether mineral-production facilities would be displaced and to insure that no significant mineral resource would be lost. We also suggest that the effect of the project on mineral resources and operations be discussed further in both documents.

Response: Qualified geologists have made on-site surface and subsurface examination of the proposed sites. Subsurface investigations have been made to a depth equal to the planned height of the proposed structures. No significant mineral resources will be lost by the installation of the project. See page 37 of the environmental impact statement and page 50 of the plan.

Comment: The average annual damages of \$278,000 appear high when compared to the damages recorded from the greatest flood of record. The difference in meaning is not clear between "Average annual direct damage from floodwater and sediment in the watershed is estimated to be \$278,400 under future conditions without the project" and ". . . average annual net loss of \$109,800 in benefits to the project area." Again, we suggest clarification for the average reader so that no one mistakes these remarks as a comparison.

Response: Historical flood damage shown in the plan and statement are reported by price levels for the year of the flood. Estimated average annual damage for future conditions without project are based on current normalized prices for agriculture and current (1975) price levels for non-agricultural property. Included in the evaluation of future damage without project are some changes in cropping patterns and some increase in crop yields. The final statement clarifies the reference to Appendix A to show the net loss of benefits with "No Project" is the difference between the average annual project benefits and the average annual costs of the project. This is explained on page 41 of the environmental impact statement.

Comment: The draft plan states, ". . . water storage in general is being depleted" and that "Water rights are adequate and wells are used to supplement most of the surface water rights." This is followed by "A declining water table during the last decade and the resulting limitations on

irrigation water are the most serious problems facing irrigation farmers." We suggest that the distinction between water rights and water supply be clarified for the average reader.

Response: The statement referring to water rights has been deleted from the plan and final statement. This will clarify the question raised relative to water supply and water rights.

Comment: Archeological, Historical, and Unique Resources - The Museum of New Mexico has recommended excavation of several historic and prehistoric ruins or sites, but there is no indication in the draft statement of intent by the Soil Conservation Service to implement this recommendation. The final statement should include a clear and definite action plan to mitigate the adverse effects of the project upon non-renewable cultural resources.

Response: A definite plan of action is included in the final statement on page 35 and on page 55 of the plan to the effect that excavation and salvage will be done by archeologists from the National Park Service. The excavation and salvage will be done prior to construction of project measures.

Comment: Adverse Environmental Effects Which Cannot Be Avoided - In the final statement archeological and historical sites that are to be destroyed or disturbed should be included in this section.

Response: The final statement has the above comment added on page 38, item f.

Comment: Irreversible and Irretrievable Commitments of Resources - The destruction of archeological sites represents a permanent commitment of such resources. This is true even if the sites are salvaged.

Response: Excavation and salvage of any archeological material has been noted as a disturbing or damaging action to the archeological sites in the final statement on page 42.

Comment: The proposed action will not adversely affect any existing or proposed unit of the National Park System nor any known natural, historical, or environmental education site eligible for the National Landmark Programs.

Response: Noted.

Comment: The Department stated that Brantley Dam and Reservoir should be mentioned in the sections relating to fish and wildlife, recreation, and projects of other agencies. Also, while sediment is not evaluated, your project should be beneficial to the Brantley Project in this regard.

Response: Information on Brantley Dam and Reservoir has been added to the plan under "Projects of Other Agencies" on page 22. Sediment yield reduction by the watershed project has been evaluated and discussed in the plan on page 47 and in the statement on page 33.

Comment: We also have the following minor comments: We suggest using "fresh" before "ground water" since there are quantities of poor quality ground water in the area. The meaning of the phrase, "remnant stands of saltcedar" is not clear. This could refer to areas where saltcedar has been cleared or areas where it is dying out.

Response: The sentence "There is no known source of additional unappropriated ground water within the watershed area" has been deleted from the final plan and statement. Both ground water and surface water are fully appropriated and adjudicated by the courts.

"Remnant stands of saltcedar" is correct. These remnant stands of saltcedar are stands left after larger areas were cleared for farmland near the Pecos River. Clearing of saltcedar was also carried out for other purposes.

Environmental Protection Agency

Comment: The statement should discuss the existing water quality for Cottonwood and Walnut Creeks, using the parameters in the New Mexico Water Quality Standards. Since the quality of water may affect the proposed uses of the multiple-use reservoir, the predicted water quality of the reservoir after project completion should also be given in the final environmental statement.

Response: Water quality standards have not been established on Walnut or Cottonwood Creeks. The final plan, on page 6, and statement, on page 14, include a discussion of the quality of ground water and surface water to be used in the recreation pool at site 19. Chemical analysis indicates that the quality of water is within the New Mexico standards established for non-body contact water sports, such as fishing, hunting, and boating. This analysis in the plan is Appendices A, B, and C, and Appendix D in the environmental impact statement.

Comment: The work plan contains much information that should be summarized and included in the final environmental statement. For example, the statement should include more detailed discussion of the project features and the considered alternatives.

Response: The final statement, on pages 38, 39, and 40, reflects additional information from the plan on the impacts of the alternatives.

Comment: The work plan contains a more detailed discussion of the multiple-purpose structure at Site 19 than the discussion in the environmental statement.

Response: A summary of the significant features of site 19 is included in the statement. Not all of the engineering details for site 19 in the work plan are repeated in the environmental statement. The guidelines published in the Federal Register, dated June 3, 1974, Department of Agriculture - Environmental Impact Statements, were followed in discussing site 19, a multi-purpose structure.

Comment: The parking areas at the state park should be described in more detail, such as locations, size, surface materials, and drainage features. Possible pollutants in runoff from the roads and parking areas could include fuels, oils, tars, and heavy metals. Since pollutants could affect the uses of the reservoir, this should be considered in the final statement.

Response: Additional details are included in the final statement on page 6 concerning the parking areas. Final designs on the recreation facilities will not be made until the project is approved and funded. At that time, precise details will be included in the recreation facilities architectural and engineering plan.

Comment. A detailed discussion is needed with regard to the sanitary facilities of the park, including the method of disposal of the wastes from the chemical toilets and the location of the comfort stations.

Response: This information has been added to the final statement on page 6.

Comment: The provisions to be made for the collection and disposal of solid wastes should be described in the final statement.

Response: This information has been added to the final statement on page 6.

Comment: No mention is made of the use of pesticides in the project area. If any pesticides may be used, the final statement should identify the chemicals to be used, state the methods of application, and give assurance that all applications will be consistent with the Federal Insecticide, Fungicide, and Rodenticide Act, as amended.

Response: This information has been included in the final statement on page 11 and in the plan on page 57 to the extent that information is now known.

Comment: The final statement should discuss more fully the proposed 9.7 miles of channel work. Measures to be implemented to mitigate erosion both during the construction phase and after completion should be described.

Response: Discussion of the measures to be implemented during construction and after completion of the channel work to reduce erosion have been included on pages 7, 8, and 9 in the final statement and on pages 38, 39, and 40 of the plan.

Comment: Since the channel work to be done involves "about 1.1 miles of high value wildlife habitat," the wildlife to be affected should be described. It is stated, "any wildlife habitat destroyed will be replaced to the greatest practicable extent by planting selected species of trees" (page 7). Measures which will be taken should this revegetating measure not be effective and those which will be taken before the revegetating occurs (e.g., grass planting) should also be discussed.

Response: A discussion on the wildlife which will be affected by channel work involving "high quality wildlife habitat" has been added on page 7 to the final statement. The planting of selected trees and grass seeding on disturbed areas and channel slopes will be carried out under standards and procedures developed by the Soil Conservation Service.

Comment: Those comments classify your Draft Environmental Impact Statement as LO-2. Specifically, we have no objections to the project; however, more information is needed to evaluate the long-term impacts of the project on the environment. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Response: Noted.

Department of Transportation

The Department had no comment.

Advisory Council on Historic Preservation

Comment: Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470(f)). The Council must have evidence that the most recent listing of the National Register of Historic Places has been consulted.

Response: The Federal Register containing the most recent listing of the National Register of Historic Places has been consulted. No National Register property will be affected by the proposed project. A statement to this effect has been added to the final environmental statement on pages 24 and 35, and to the work plan on page 16.

Comment: Under Section 1 (3), Federal agencies are required to establish procedures regarding the preservation and enhancement of non-federally owned historic, architectural, and archeological properties in the execution of their plans and programs.

The environmental statement should contain a determination as to whether or not the proposed undertaking will contribute to the preservation and enhancement of non-federally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance.

Response: Provisions for the preservation of any archeological or historic materials found at the proposed construction sites have been made. Additional details on mitigation of adverse effects of the installation of project measures and the excavation and salvage of cultural materials is included on pages 9 and 35 of the final environmental statement, and on pages 53 and 55 of the work plan.

Comment: The procedures for compliance with Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593 require the Federal agency to consult with the appropriate State Historic Preservation Officer.

Response: The New Mexico State Historic Preservation Officer was consulted on the cultural properties in the watershed. This information is included in the final statement on page 42.

Comment: The draft environmental statement quotes from the report prepared by the Museum of New Mexico on its survey of the impacted watershed area, made pursuant to SCS's Executive

Order 11593 responsibilities, appear to be contradictory. The statement made by the Museum "Of all the sites encountered on the survey, the Jornada sites--if that is what they are, offer the greatest potential for obtaining valuable information concerning the prehistoric occupants of the southern Pecos Valley" conflicts with the following statement that "none of the sites recorded warrant being listed on either the National or State Registers of significant sites." While it may be true that none of these sites represent "major settlements of prehistoric Indians," the National Register Criteria, as republished in Section 800.10 of the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R Part 800), define an archeological site to be eligible for inclusion in the National Register when that site has "yielded, or may be likely to yield, information important in prehistory or history." Therefore, it would appear that the sites the Museum believes warrant further investigation may be eligible for inclusion in the National Register.

In accordance with Section 2(b) of the Executive Order 11593 and Section 800.4(a)(2) of the Procedures, the Council requests that SCS request in writing an opinion from the Secretary of the Interior respecting these properties' eligibility for inclusion in the National Register and inform us of the findings. SCS is reminded that should the Secretary of the Interior determine these properties eligible for inclusion in the National Register, it is required, pursuant to the Procedures, to afford the Council an opportunity to comment on the effects of the undertaking on the cultural resources prior to initiating any activity, including archeological excavation which may be the most prudent and feasible means of mitigating the project's adverse effects, but is itself a destructive action.

Response: The Soil Conservation Service has requested an opinion in writing from the Secretary of Interior regarding the eligibility of the identified cultural sites for nomination to the National Register of Historic Places. Provisions of Section 800.4(a)(2) of the Procedures for the Protection of Historic and Cultural Properties and Section 2(b) of Executive Order 11593 will be complied with prior to construction. This is noted on pages 9 and 43 of the final environmental impact statement.

New Mexico State Engineer (Governor's Representative)

Comment: We have reviewed the work plan and note that it clarifies the points raised in my October 24, 1974 letter. We have

no further comments regarding the work plan or the environmental impact statement.

This project will afford much needed protection to the agricultural land in the lower Cottonwood-Walnut Creek area and to the urban area developing to the north of Artesia. I support the Cottonwood-Walnut Creek Watershed Project and urge early approval for construction.

Response: Noted.

New Mexico State Planning Office (State Clearinghouse)

Comment: The State Planning Office (State Clearinghouse) has reviewed the Cottonwood-Walnut Creek Watershed Draft Environmental Impact Statement.

Our only comment is that during the construction and implementation phases of this project you take all possible precautions to insure the integrity of the environment.

Response: The work plan and environmental statement describe measures that will be followed in the installation, operation, and maintenance of project measures to protect and enhance the environment. This discussion is on pages 7, 8, and 9 of the environmental statement and on pages 38, 39, 40, 48, and 49 of the work plan.

New Mexico State Historic Preservation Officer

Comment: This is to inform you that I have reviewed the draft Environmental Impact Statement and Work Plan for the Cottonwood-Walnut Creek Watershed, with reference to cultural properties. I agree that the best method of mitigating the adverse effect of the project on historical and archeological sites would be through excavation. This would mean excavation of the four prehistoric sites, and test excavation of the ten historic sites. It will be up to the professional archeologist employed to decide whether to complete the excavation of several or all of the historic sites.

Response: The work plan and environmental impact statement discuss the method of mitigating adverse effects on the archeological and historic sites. The final plan and statement make it clear that excavation and salvage will be done by professional archeologists and that this work will be done prior to any project construction at the identified

cultural sites. This discussion is on pages 9 and 43 of the environmental impact statement, and on page 53 of the work plan.

New Mexico Environmental Improvement Agency

Comment: We have reviewed the above referenced plan and statement. We commend you on its excellence. We support your efforts, particularly as they relate to reduction of sediment entering the Pecos River.

Response: Noted.



A P P E N D I X E S

APPENDIX A - Comparison of Benefits and Costs for Structural Measures

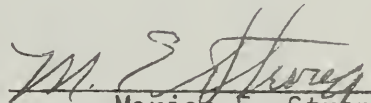
APPENDIX B - Project Map

APPENDIX C - Letters of Comment Received on the Draft Environmental Statement

APPENDIX D - Chemical Analyses of Surface and Ground Water.

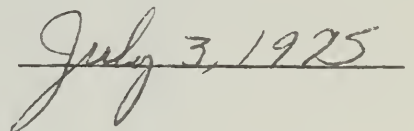
APPENDIX E - Glossary

Approved by



Marion E. Strong
State Conservationist

Date:



July 3, 1925



APPENDIX A

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES Cottonwood-Walnut Creek Watershed, New Mexico

(Dollars)

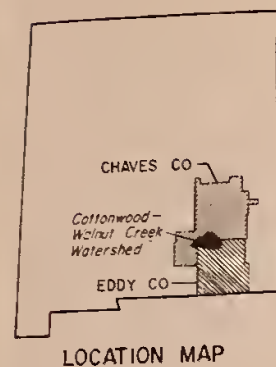
Evaluation Unit	AVERAGE ANNUAL BENEFITS ^{1/}					Total	:Avg. Annual: Cost	:Benefit : Cost Ratio
	Damage ^{2/} Reduction	Recreation	Redevelopment	Secondary				
Cottonwood Creek	391,100	98,100	134,600	50,600		674,400	543,100	1.2:1
Walnut Creek	72,300	--	14,100	7,100		93,500	56,200	1.7:1
Project Administration	--	--	--	--		--	58,800	--
GRAND TOTAL	463,400	98,100	148,700	57,700		767,900	658,100	1.2:1

^{1/} Price Base: Agr. Current normalized; Non-Agr. 1975.

^{2/} It is estimated that land treatment measures will provide a 5 percent reduction in sediment yield to the floodplain or about \$3,500 average annual damage reduction benefits.

^{3/} Includes installation cost of structural measures amortized at 5-7/8 percent interest for 100 years and estimated average annual operation and maintenance cost.

June 1975



- LEGEND
- Federal Highway
 - State Highway
 - County Line
 - Railroad
 - Drainage
 - City or Town
 - Watershed Boundary
 - Channel Work
 - Floodwater Diversion
 - Recreation Development
 - Area Benefited
 - Area Benefited and Controlled
 - Area Controlled by Structure
 - Floodwater Retarding Structure
 - Multiple Purpose Structure
 - Site Number
 - Drainage Area (Square Miles)

APPENDIX B

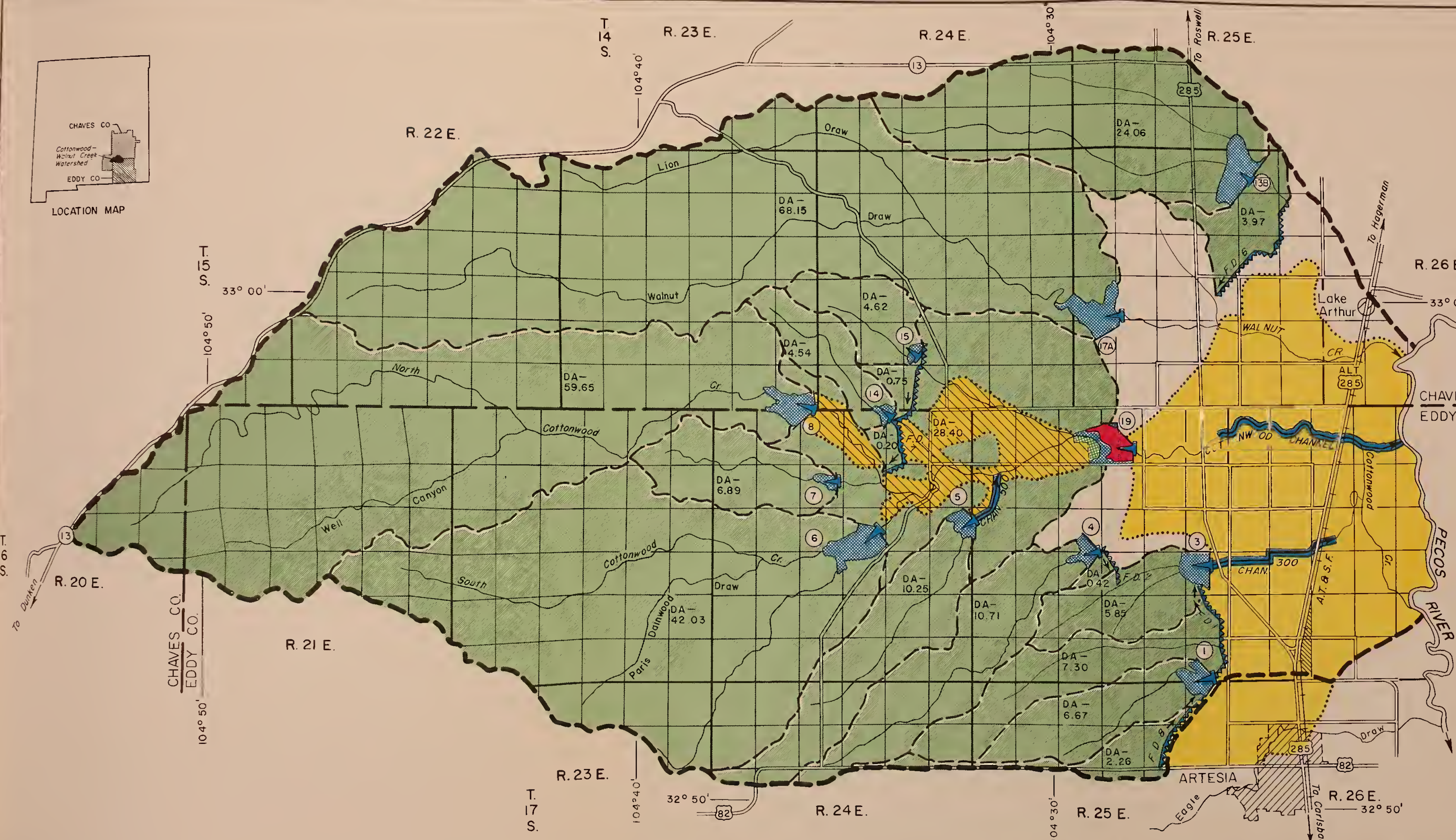
PROJECT MAP
COTTONWOOD - WALNUT CREEK WATERSHED
CHAVES & EDDY COUNTIES, NEW MEXICO

AUGUST 1974

APPROX. SCALE 1:126,720

Projection Unknown

SEPTEMBER 1974 4-R-33981

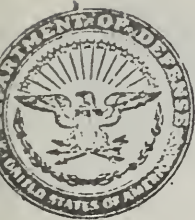




APPENDIX C

LETTERS OF COMMENT RECEIVED ON DRAFT ENVIRONMENTAL IMPACT STATEMENT





Secy's Cont. No. 96127
DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

Deputy Administrator
Water Resources

5/5 Klingenstein

30 APR 1975

5/6

Honorable Robert W. Long
Assistant Secretary of Agriculture
Washington, D. C. 20250

Control No.

06 - 96127-V

Referred to: SCS

Date:

B MAY 05 1975

Dear Mr. Long:

In compliance with the provisions of Section 5 of Public Law 566, 83d Congress, the views of the Secretary of the Army were requested for the Watershed Work Plan and Draft Environmental Impact Statement for Cottonwood-Walnut Creek Watershed, Chaves and Eddy Counties, New Mexico.

We have reviewed the work plan and foresee no conflict with any projects or current proposals of this Department.

The draft environmental impact statement is considered to be satisfactory.

Sincerely,

Charles R. Ford

Charles R. Ford
Deputy Assistant Secretary of the Army
(Civil Works)





DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL

March 31, 1975

BUREAU OF LABORATORIES
VECTOR-BORNE DISEASES DIVISION
POST OFFICE BOX 2087
FORT COLLINS, COLORADO 80521

State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
517 Gold Avenue, SW.
Albuquerque, New Mexico 87103

Dear Sir:

By copies of two enclosed letters I am calling your attention to the need for evaluating the impacts of water resources projects upon vector-borne diseases.

Sincerely yours,

Richard O. Hayes, Ph.D., M.P.H.
Chief, Water Resources Branch

Enclosures





United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

PEP ER-75/202

MAY 1 1975

Dear Mr. Strong:

Thank you for your letter of February 25, 1975, requesting our views and comments on the work plan and draft environmental statement for the Cottonwood-Walnut Creek Watershed, Chaves and Eddy Counties, New Mexico. We have comments on both documents.

Work Plan

The Department's Fish and Wildlife Service notes that the work plan contains proper treatment of fish and wildlife measures. The proposed plan of development would create additional fish and wildlife habitat with the installation of a multipurpose pool to be managed by the New Mexico Department of Game and Fish.

The proposed action will not adversely affect any existing or proposed unit of the National Park System nor any known natural, historical, or environmental education site eligible for the National Landmark Programs.

We also have the following minor comments. On page 8, first paragraph, we suggest using "fresh" before "ground water" since there are quantities of poor quality ground water in the area. On page 12, first paragraph, the meaning of the phrase, "remnant stands of saltcedar" is not clear. This could refer to areas where saltcedar has been cleared or areas where it is dying out.

On pages 18, 20, 22, and 81, we believe the Brantley Dam and Reservoir should be mentioned in the sections relating to fish and wildlife, recreation, and projects of other agencies. Also, while sediment is not evaluated, your project should be beneficial to the Brantley Project in this regard.



Save Energy and You Serve America!

We also note in both documents that the estimated cost of annual flood damage, particularly on Walnut and Cottonwood Creeks, appears to be very high. Firm evidence regarding this amount of damage should be included in the work plan in order to make possible evaluation of related impacts on the human environment.

Environmental Statement

The document appears to have adequately described the project's impacts on fish and wildlife resources.

We find the draft statement reasonably adequate in its evaluation of the environmental impact of the proposed action regarding geology and hydrology with the following exceptions.

Omitted from the list of adverse effects is the loss of water by evaporation. It is proposed to use ground water to supply the recreational pool at the multiple-purpose structure on Cottonwood Creek in the amount of 767 acre-feet per year (page 10) to maintain a lake of 150 acres. Evaporation in the area normally exceeds 5 feet per year, hence it would be impossible to maintain a 150 acre lake at a pumpage rate of only 767 acre-feet per year.

Recent chemical analyses of water from the three artesian water wells, which are to be the supply wells at the recreational site, should be made and studied in regard to the water quality of the recreation pool. Some of the chemical analyses in the appendices of the draft statement were made in 1927 and 1928, and it is not clear which wells were sampled. Hydrogen sulfide in the ground water could be an important factor.

The draft statement and work plan both state that raw materials for construction of dams and other earthwork are available from sediment pool and reservoir areas and from emergency spillways. The draft statement also states, on page 17, that, "Other mineral resources within the watershed at the present time are two producing gas and oil wells. There are no known metallic minerals in the area. Caliche pits are opened as needed for road construction but are not permanent installations." However, impacts of the project on mineral resources and operations are not described.

When this Department's Bureau of Mines reviewed the project informally for the Soil Conservation Service, it was stated that apparently no mineral resource or facility would be adversely affected, but the Bureau cautioned that only an onsite investigation would disclose currently active operations or possibly unidentified mineral resources that might be affected. The current review indicates that the assessment is still valid. Although Chaves and Eddy Counties yield large amounts of potassium salts, petroleum, natural gas, and some mineral commodities of lesser value, most of this production is outside the watershed. Known mineral resources and operations in the project area are limited to those mentioned in the statement but, in addition, sand and gravel have been produced from several pits in the watershed in past years. Despite the fact that development of mineral resources would be precluded or hampered on the 10,000 acres dedicated to structural measures, sand and gravel or caliche deposits lost would be insignificant compared with other nearby deposits presently available along the Pecos River. Much oil and gas are produced southeast of the watershed, but the project should not hamper exploration for or production of these resources.

We recommend that qualified personnel examine the sites of proposed structures to determine whether mineral-production facilities would be displaced and to insure that no significant mineral resource would be lost. We also suggest that the effect of the project on mineral resources and operations be discussed further in both documents.

Page 13, paragraph 6, states, "water storage in general is being depleted." On page 18, paragraph 4, the statement is made, "Water rights are adequate and wells are used to supplement most of the surface water rights." This is followed on page 25, paragraph 1, by, "A declining water table during the last decade and the resulting limitations on irrigation water are the most serious problems facing irrigation farmers." We suggest that the distinction between water rights and water supply be clarified for the average reader.

Page 26, last paragraph, the average annual damages of \$278,000 appear high when compared to the damages recorded from the greatest flood of record. The difference in meaning is not clear between "Average annual direct damage from floodwater and sediment in the watershed is estimated to be \$278,400 under future conditions without the project." and page 41, paragraph 3, ". . . average annual net loss of \$109,800 in benefits to the project area." Again, we suggest clarification for the average reader so that no one mistakes these remarks as a comparison.

Page 35, Archeological, Historical, and Unique Resources, paragraph 3. The Museum of New Mexico has recommended excavation of several historic and prehistoric ruins or sites, but there is no indication in the draft statement of intent by the Soil Conservation Service to implement this recommendation. The final statement should include a clear and definite action plan to mitigate the adverse effects of the project upon non-renewable cultural resources.

Page 38, Adverse Environmental Effects Which Cannot Be Avoided. In the final statement archeological and historical sites that are to be destroyed or disturbed should be included in this section.

Page 42, Irreversible and Irretrievable Commitments of Resources. The destruction of archeological sites represents a permanent commitment of such resources. This is true even if the sites are salvaged.

We hope these comments will assist you in preparing the final documents.

Sincerely yours,



Deputy Assistant Secretary of the Interior

Mr. Marion E. Strong
State Conservationist
Soil Conservation Service
Department of Agriculture
Post Office Box 2007
Albuquerque, New Mexico 87103

ENVIRONMENTAL PROTECTION AGENCY

REGION VI

1600 PATTERSON, SUITE 1100

DALLAS, TEXAS 75201

March 25, 1975

16-V
OFFICE OF THE
REGIONAL ADMINISTRATOR

Mr. Marion E. Strong
State Conservationist
Soil Conservation Service
Box 2007
Albuquerque, New Mexico 87103

Re: D-SCS-G36013-NM
Your Re: USDA-SCS-EIS-WS-(ADM)-74-2-(D)-NM

Dear Mr. Strong:

We have reviewed the Draft Environmental Impact Statement and Watershed Work Plan for the Cottonwood-Walnut Creek Watershed, Chaves and Eddy Counties, New Mexico. The proposed project provides for watershed protection, flood prevention, and recreational development. Specific project features consist of land treatment measures to be applied on 140,000 acres of rangeland and 20,000 acres of irrigated cropland; eleven floodwater retarding structures; one multi-purpose structure for flood protection and recreation; five floodwater diversions with grade stabilization structures; and three channels with grade stabilization structures.

The following comments are for your consideration in preparing the final statement:

1. The statement should discuss the existing water quality for Cottonwood and Walnut Creeks, using the parameters in the New Mexico Water Quality Standards. Since the quality of water may affect the proposed uses of the multiple-use reservoir, the predicted water quality of the reservoir after project completion should also be given in the final environmental statement.

2. The work plan contains much information that should be summarized and included in the final environmental statement. For example, the statement should include more detailed discussion of the project features and the considered alternatives.

3. The work plan on pages 36 and 37 contains a more detailed discussion of the multiple-purpose structure at Site 19 than the discussion in the environmental statement. The following information with regard to the proposed recreational facilities at the reservoir needs to be included in the final statement:

(a) The parking areas at the state park should be described in more detail, such as locations, size, surface materials, and drainage features. Possible pollutants in runoff from the roads and parking areas could include fuels, oils, tars, and heavy metals. Since pollutants could affect the uses of the reservoir, this should be considered in the final statement.

(b) A detailed discussion is needed with regard to the sanitary facilities of the park including the method of disposal of the wastes from the chemical toilets and the location of the comfort stations.

(c) The provisions to be made for the collection and disposal of solid wastes should be described in the final statement.

This information is needed to evaluate any long-term environmental impacts that could be generated by the recreational development.

4. No mention is made of the use of pesticides in the project area. If any pesticides may be used, the final statement should identify the chemicals to be used, state the methods of application, and give assurance that all applications will be consistent with the Federal Insecticide, Fungicide, and Rodenticide Act, as amended.

5. The final statement should discuss more fully the proposed 9.7 miles of channel work. Measures to be implemented to mitigate erosion both during the construction phase and after completion should be described.

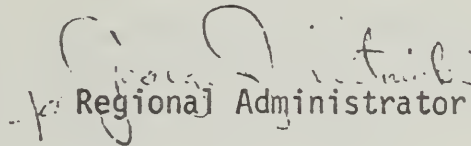
Since the channel work to be done involves "about 1.1 miles of high value wildlife habitat," the wildlife to be affected should be described. It is stated, "any wildlife habitat destroyed will be replaced to the greatest practicable extent by planting selected species of trees" (page 7). Measures which will be taken should this revegetating measure not be effective and those which will be taken before the revegetating occurs (eg., grass planting) should also be discussed.

These comments classify your Draft Environmental Impact Statement as LO-2. Specifically, we have no objections to the project; however, more information is needed to evaluate the long-term impacts of the project on the environment. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the attachment. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and on the adequacy of the impact statement at the draft stage, whenever possible.

We appreciate the opportunity to review the Draft Environmental Impact Statement, and we will be happy to discuss our comments with you. Please send us two copies of the Final Environmental Impact Statement at the same time it is sent to the Council on Environmental Quality.

Sincerely yours,


Regional Administrator

Enclosure



ENVIRONMENTAL IMPACT OF THE ACTION

LO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects.

EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

ADEQUACY OF THE IMPACT STATEMENT

Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.



(202) 426-2262

18 MAR 1975

Mr. Marion E. Strong
State Conservationist
Soil Conservation Service
Box 2007
Albuquerque, New Mexico 87103

Dear Mr. Strong:

This is in response to your letter of 25 February 1975 addressed to Admiral Owen W. Siler, Commandant, U. S. Coast Guard concerning a draft environmental impact statement for the Cottonwood-Walnut Creek Watershed, Chaves and Eddy Counties, New Mexico.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,

W. E. GARDWELL
Captain, U. S. Coast Guard
Acting Chief, Office of Marine
Environment and Systems



Advisory Council
On Historic Preservation
1522 K Street N.W. Suite 430
Washington D.C. 20005

MAR 10 1975

Mr. Marion E. Strong
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 2007
Albuquerque, New Mexico 87103

Dear Mr. Strong:

This is in response to your request of February 25, 1975 for comments on the draft environmental statement (DES) and watershed work plan (WWP) for the proposed Cottonwood-Walnut Creek Watershed, New Mexico. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council has determined that while you have discussed the historical, architectural, and archeological aspects related to the undertaking, the Advisory Council needs additional information to adequately evaluate the effects on these cultural resources. Please furnish additional data indicating:

- I. Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470[f]). The Council must have evidence that the most recent listing of the National Register of Historic Places has been consulted (see Federal Register, February 4, 1975 and monthly supplements each first Tuesday thereafter) and that either of the following conditions is satisfied:
 - A. If no National Register property is affected by the project, a section detailing this determination must appear in the environmental statement.
 - B. If a National Register property is affected by the project, the environmental statement must contain an account of steps taken in compliance with Section 106 and a comprehensive discussion of the contemplated effects on the National Register property. (Procedures for compliance with Section 106 are detailed in the Federal Register of January 25, 1974.)
- II. Compliance with Executive Order 11593 "Protection and Enhancement of the Cultural Environment" of May 13, 1971.
 - A. Under Section 2(a) of the Executive Order, Federal agencies are required to locate, inventory, and nominate eligible historic, architectural and archeological properties under

their control or jurisdiction to the National Register of Historic Places. The results of this survey should be included in the environmental statement as evidence of compliance with Section 2(a).

- B. Until the inventory required by Section 2(a) is complete, Federal agencies are required by Section 2(b) of the Order to submit proposals for the transfer, sale, demolition, or substantial alteration of federally owned properties eligible for inclusion in the National Register to the Council for review and comment. Federal agencies must continue to comply with Section 2(b) review requirements even after the initial inventory is complete, when they obtain jurisdiction or control over additional properties which are eligible for inclusion in the National Register or when properties under their jurisdiction or control are found to be eligible for inclusion in the National Register subsequent to the initial inventory.

The environmental statement should contain a determination as to whether or not the proposed undertaking will result in the transfer, sale, demolition or substantial alteration of eligible National Register properties under Federal jurisdiction. If such is the case, the nature of the effect should be clearly indicated as well as an account of the steps taken in compliance with Section 2(b). (Procedures for compliance with the Executive Order are detailed in the Federal Register of January 25, 1974, "Procedures for the Protection of Historic and Cultural Properties," pp. 3366-3370.)

- C. Under Section 1(3), Federal agencies are required to establish procedures regarding the preservation and enhancement of non-federally owned historic, architectural, and archeological properties in the execution of their plans and programs.

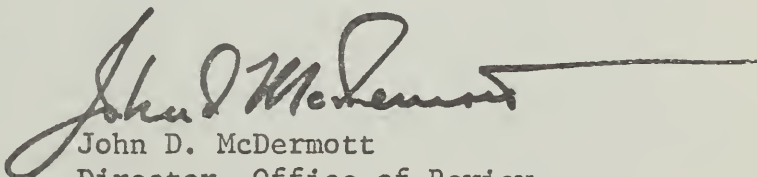
The environmental statement should contain a determination as to whether or not the proposed undertaking will contribute to the preservation and enhancement of non-federally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance.

III. Contact with the State Historic Preservation Officer.

The procedures for compliance with Section 106 of the National Historic Preservation Act of 1966 and the Executive Order 11593 require the Federal agency to consult with the appropriate State Historic Preservation Officer. The State Historic Preservation Officer for New Mexico is Thomas W. Merlan, Historic Preservation Officer, State Planning Office, 403 Capitol Building, Santa Fe, New Mexico 87501.

Should you have any questions or require any additional assistance, please contact Michael H. Bureman of the Advisory Council staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "John D. McDermott", with a long horizontal flourish extending to the right.

John D. McDermott
Director, Office of Review
and Compliance



Advisory Council
On Historic Preservation
1522 K Street N.W. Suite 450
Washington D.C. 20005

APR 8 1975

Mr. Marion E. Strong
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 2007
Albuquerque, New Mexico 87103

Dear Mr. Strong:

This is in response to your letter of March 18, 1975 concerning the Cottonwood-Walnut Creek Watershed, New Mexico, and the steps taken by the Soil Conservation Service (SCS) to comply with Section 106 of the National Historic Preservation Act of 1966 and the provisions of Executive Order 11593 "Protection and Enhancement of the Cultural Environment" of May 13, 1971 with respect to this proposed undertaking. The Advisory Council appreciates learning that SCS did examine the National Register of Historic Places and found that no registered property will be affected by the proposed undertaking. A statement of this finding in the environmental statement adequately documents SCS's compliance with Section 106.

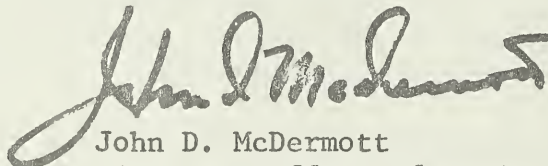
However, with regard to compliance with Executive Order 11593 we note conflicting statements in the documentation submitted for Council review. On page 23 the draft environmental statement quotes from the report prepared by the Museum of New Mexico on its survey of the impacted watershed area, made pursuant to SCS's Executive Order 11593 responsibilities, appear to be contradictory. The statement made by the Museum "Of all the sites encountered on the survey, the Jornada sites--if that is what they are, offer the greatest potential for obtaining valuable information concerning the prehistoric occupants of the southern Pecos Valley" conflicts with the following statement that "none of the sites recorded warrant being listed on either the National or State Registers of significant sites." While it may be true that none of these sites represent "major settlements of prehistoric Indians," the National Register Criteria, as republished in Section 800.10 of the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), define an archeological site to be eligible for inclusion in the National Register when that site has "yielded, or may be likely to yield, information important in prehistory or history." Therefore, it would appear that the sites the Museum believes warrant further investigation may be eligible for inclusion in the National Register.

In accordance with Section 2(b) of the Executive Order 11593 and Section 800.4(a)(2) of the Procedures, the Council requests that SCS request in writing an opinion from the Secretary of the Interior respecting these properties' eligibility for inclusion in the National Register and inform us of the findings. SCS is reminded that should the Secretary of the Interior determine these properties eligible for inclusion in the National Register, it is required, pursuant to the Procedures, to afford the Council an opportunity to comment on the effects of the undertaking on the cultural resources prior to initiating any activity, including archeological excavation which may be the most prudent and feasible means of mitigating the project's adverse effects, but is itself a destructive action.

The Council suggests SCS undertake the evaluation of these properties as expeditiously as possible to avoid any unnecessary delays in the project.

If you have questions or require additional assistance in this matter, please contact Michael H. Bureman of the Advisory Council staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "John D. McDermott", with a long horizontal flourish extending to the right.

John D. McDermott
Director, Office of Review
and Compliance

cc: Thomas W. Merlan-NM:HPO
Zane G. Smith-AG:FLO



STATE OF NEW MEXICO

STATE ENGINEER OFFICE

SANTA FE

Bataan Memorial Building
STATE CAPITOL
SANTA FE, NEW MEXICO 87501

S. E. REYNOLDS
STATE ENGINEER

March 4, 1975

Mr. Marion E. Strong
State Conservationist
Soil Conservation Service
Post Office Box 2007
Albuquerque, New Mexico 87103

Dear Marion:

Your February 25, 1975 letter requests comments on the Cottonwood-Walnut Creek Watershed Work Plan and draft environmental impact statement.

We have reviewed the work plan and note that it clarifies the points raised in my October 24, 1974 letter. We have no further comments regarding the work plan or the environmental impact statement.

This project will afford much needed protection to the agricultural land in the lower Cottonwood-Walnut Creek area and to the urban area developing to the north of Artesia. I support the Cottonwood-Walnut Creek Watershed Project and urge early approval for construction.

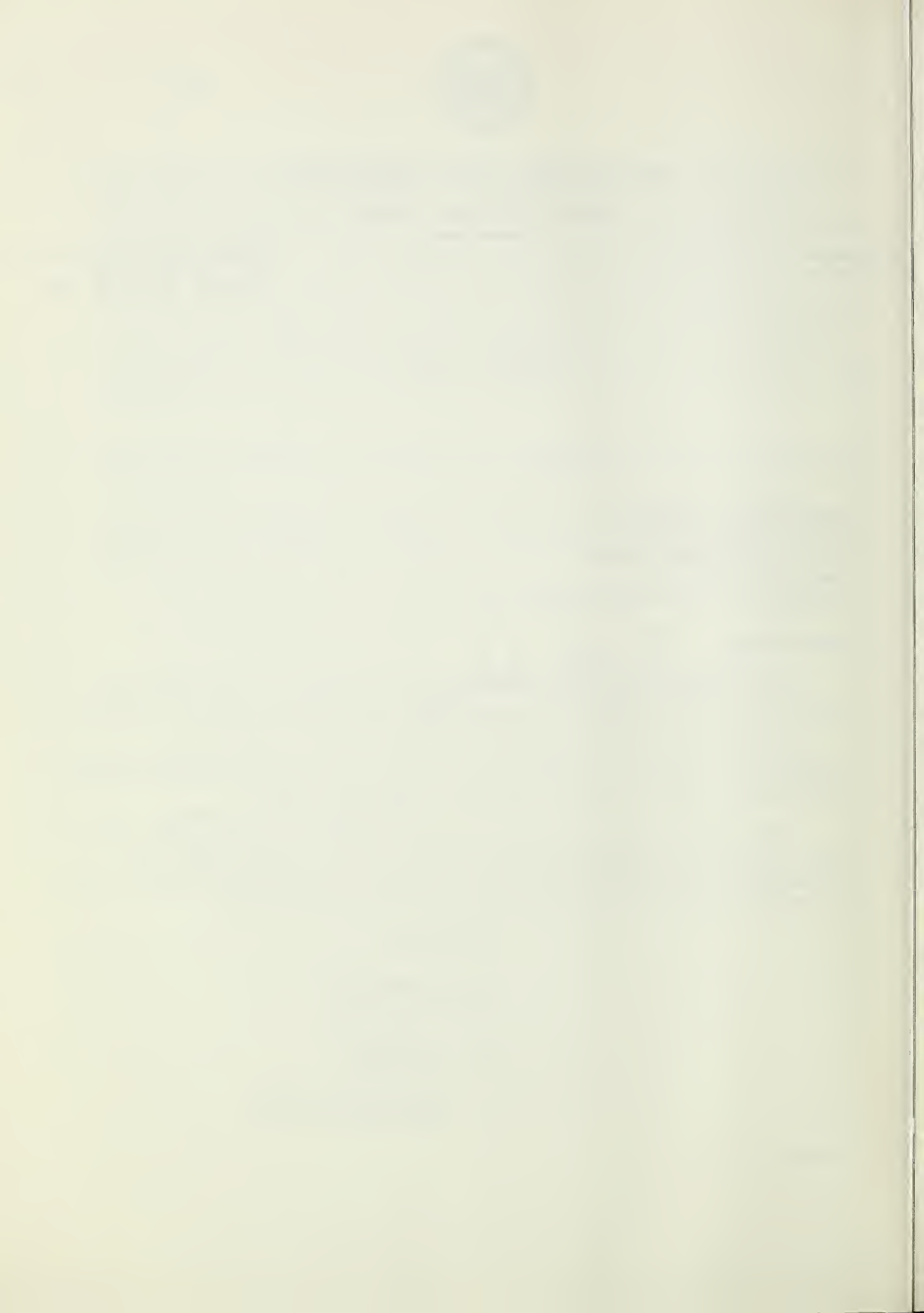
Sincerely,

S. E. Reynolds
State Engineer

By

F. R. Allen, Chief
Technical Division

FRA:pat





STATE PLANNING OFFICE

EXECUTIVE — LEGISLATIVE BUILDING
SANTA FE 87503

GRACIELA (GRACE) OLIVAREZ
STATE PLANNING OFFICER

JERRY APODACA
GOVERNOR

ROBERT S. LANDMANN
DEPUTY STATE PLANNING OFFICER

April 8, 1975

Mr. Marian Strong
State Conservationist
United States Department of
Agriculture
Soil Conservation Service
Box 2007
Albuquerque, New Mexico 87103

Dear Mr. Strong:

The State Planning Office, State Clearinghouse has reviewed the Cottonwood-Walnut Creek Watershed Draft Environmental Impact Statement.

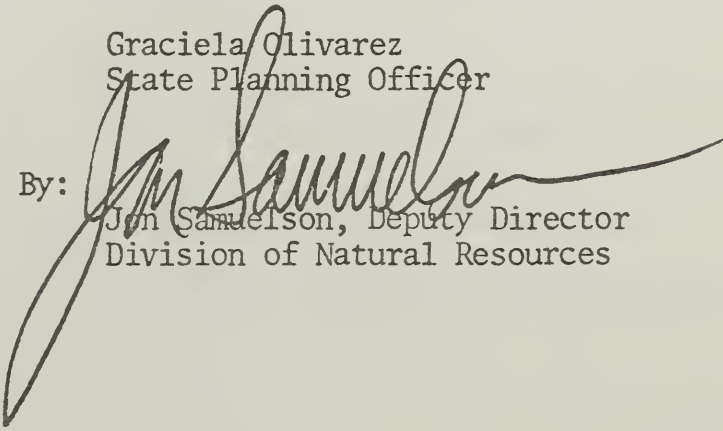
Our only comment is that during the construction and implementation phases of this project you take all possible precautions to insure the integrity of the environment.

Thank you for the opportunity to comment on this Statement.

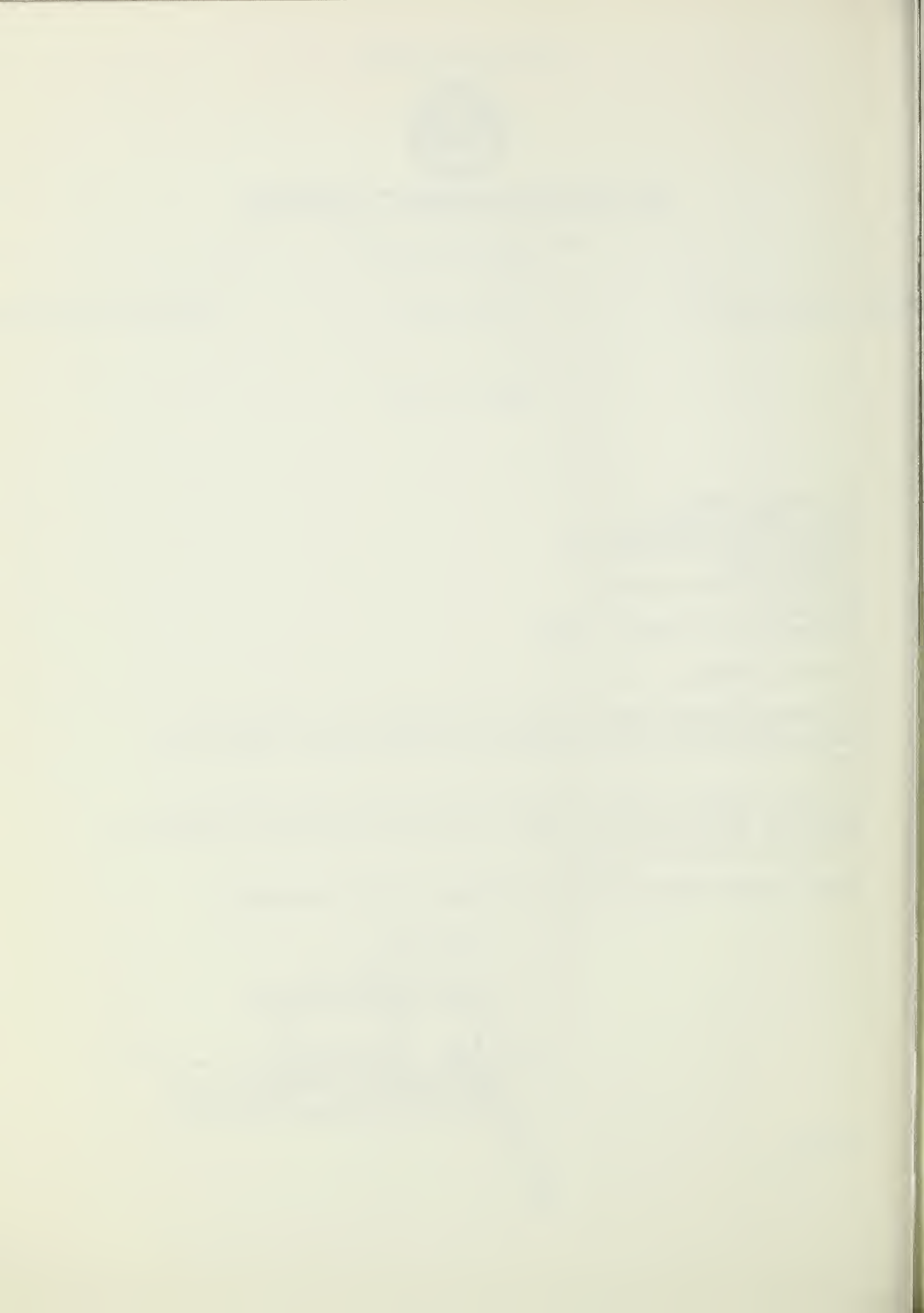
Sincerely,

Graciela Olivarez
State Planning Officer

By:


Jon Samuelson, Deputy Director
Division of Natural Resources

JS:Anne





STATE PLANNING OFFICE

EXECUTIVE — LEGISLATIVE BUILDING
SANTA FE 87503

March 18, 1975

Mr. Marion E. Strong
State Conservationist
Soil Conservation Service
Box 2007
Albuquerque, New Mexico 87103

Dear Mr. Strong:

This is to inform you that I have reviewed the draft Environmental Impact Statement and Work Plan for the Cottonwood-Walnut Creek Watershed, with reference to cultural properties. I agree that the best method of mitigating the adverse effect of the project on historical and archeological sites would be through excavation. This would mean excavation of the four prehistoric sites, and test excavation of the ten historic sites. It will be up to the professional archeologist employed to decide whether to complete the excavation of several or all of the historic sites.

Please let me know if you need any additional information.

Sincerely,

Graciela Olivarez
State Planning Officer

By: 
Thomas W. Merlan, State
Historic Preservation Officer

TWM:liz



STATE OF NEW MEXICO

P.O. Box 2348
Santa Fe, NM 87503

OFFICE OF THE DIRECTOR

February 10, 1975

Mr. Marion E. Strong
State Conservationist
United States Department of Agriculture
Soil Conservation Service
Box 2007
Albuquerque, NM 87103

Re: Draft Work Plan Cottonwood-Walnut Creek Watershed.

Dear Mr. Strong:

We have reviewed the above referenced plan and commend you on its excellence. We support your efforts, particularly as they relate to reduction of sediment entering the Pecos River.

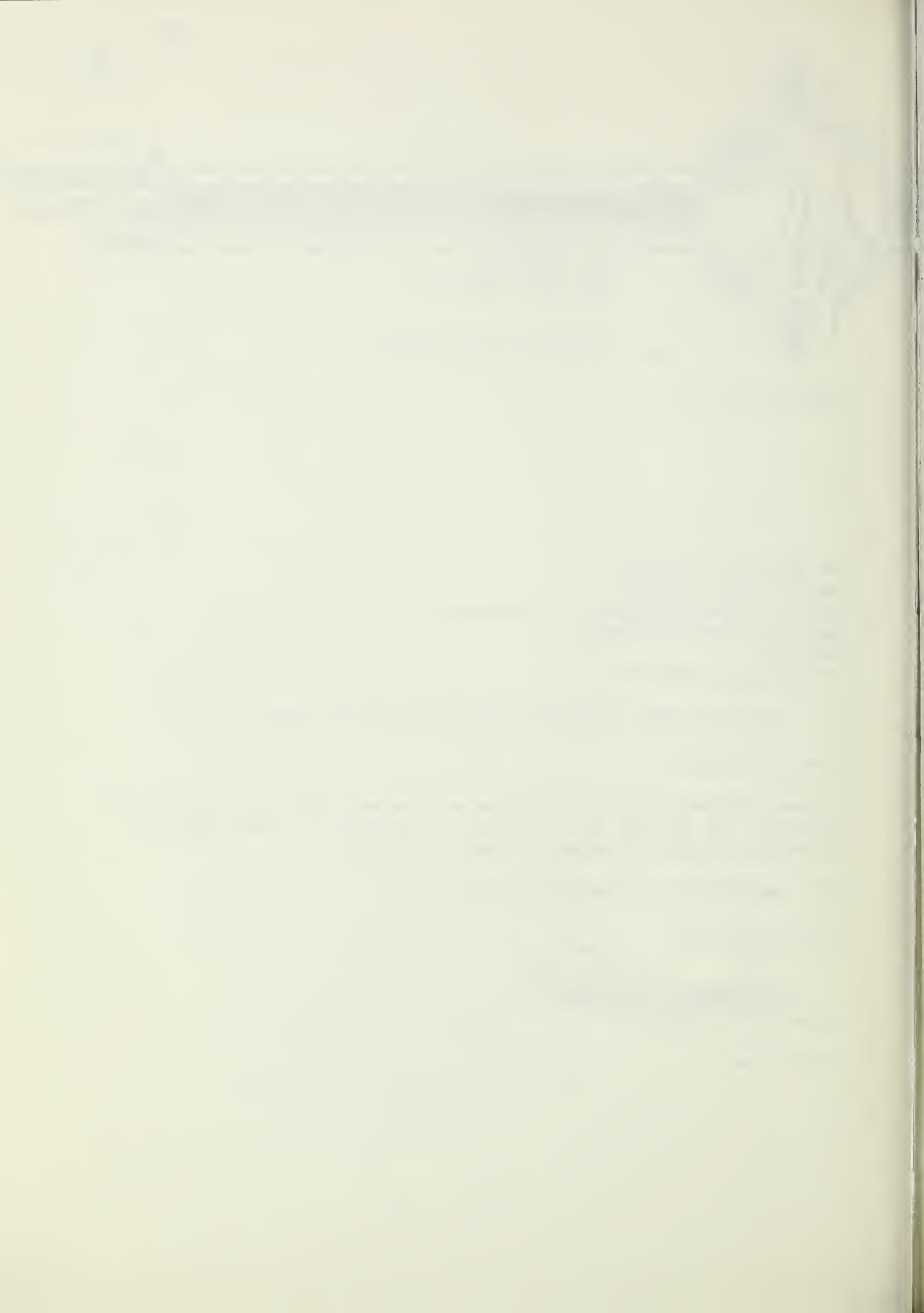
The opportunity to comment is appreciated.

Sincerely yours,

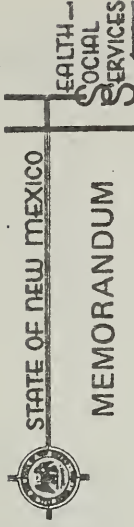
Aaron Bond, Director

AB:DGH:eem

LPPS
Environmental
Improvement
Agency



Environmental Improvement Agency
Water Quality Division
P.O. Box 2348
Santa Fe, NM 87503



MEMORANDUM

To: Marion E. Strong, State Conservationist

From: David G. Hanna, Planner IV

Date: February 28, 1975

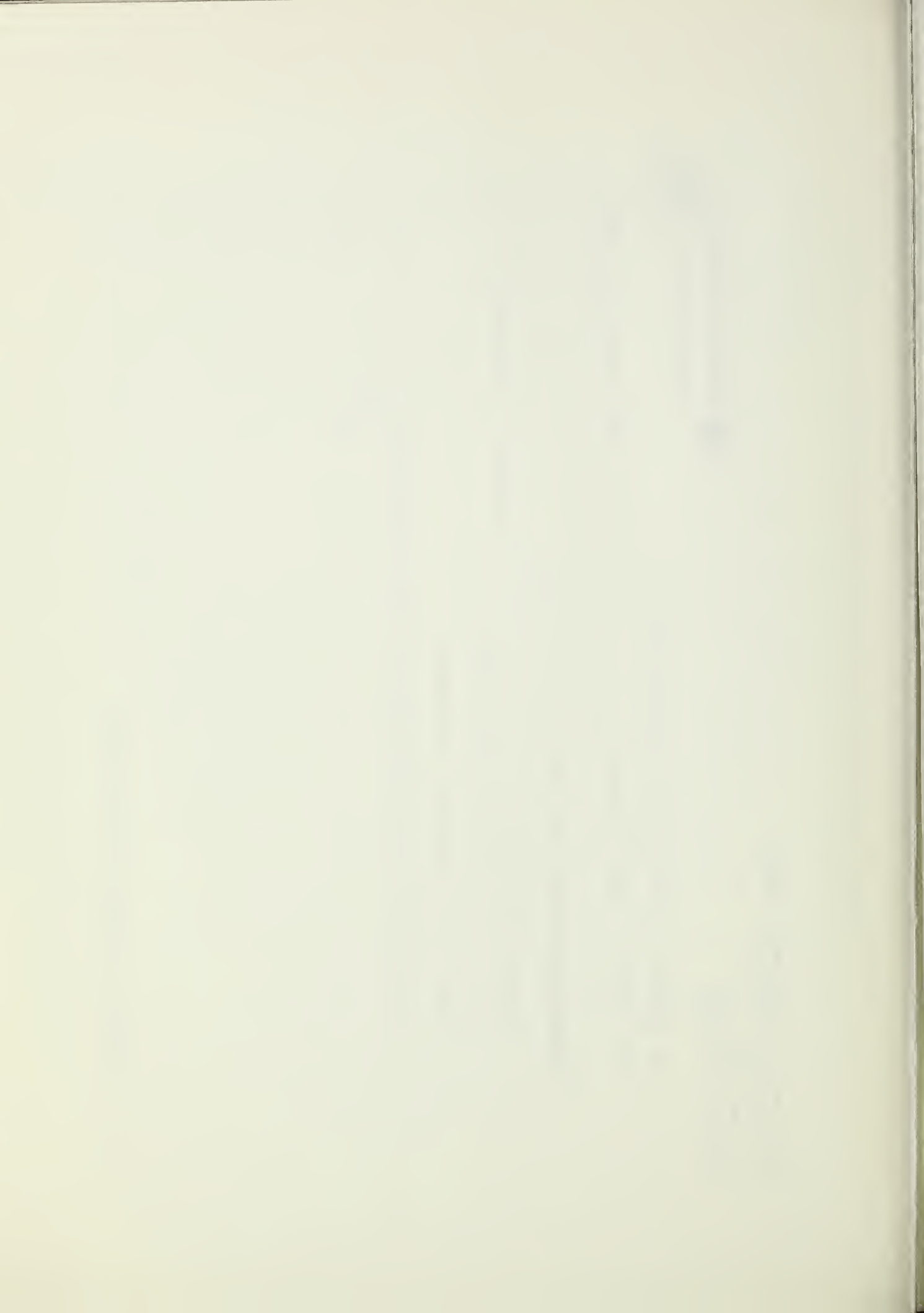
Subject: Cottonwood-Walnut Creek Watershed, New Mexico

Previous copies were received and reviewed and commented on (February 10 letter to Mr. Strong from Aaron Bond).

Thank you for opportunity to comment.

I am returning the attached copies for your re-distribution.

MS
APR 1 1975
RECEIVED
STATE OF NEW MEXICO
HEALTH AND SOCIAL SERVICES
SANTA FE, NEW MEXICO

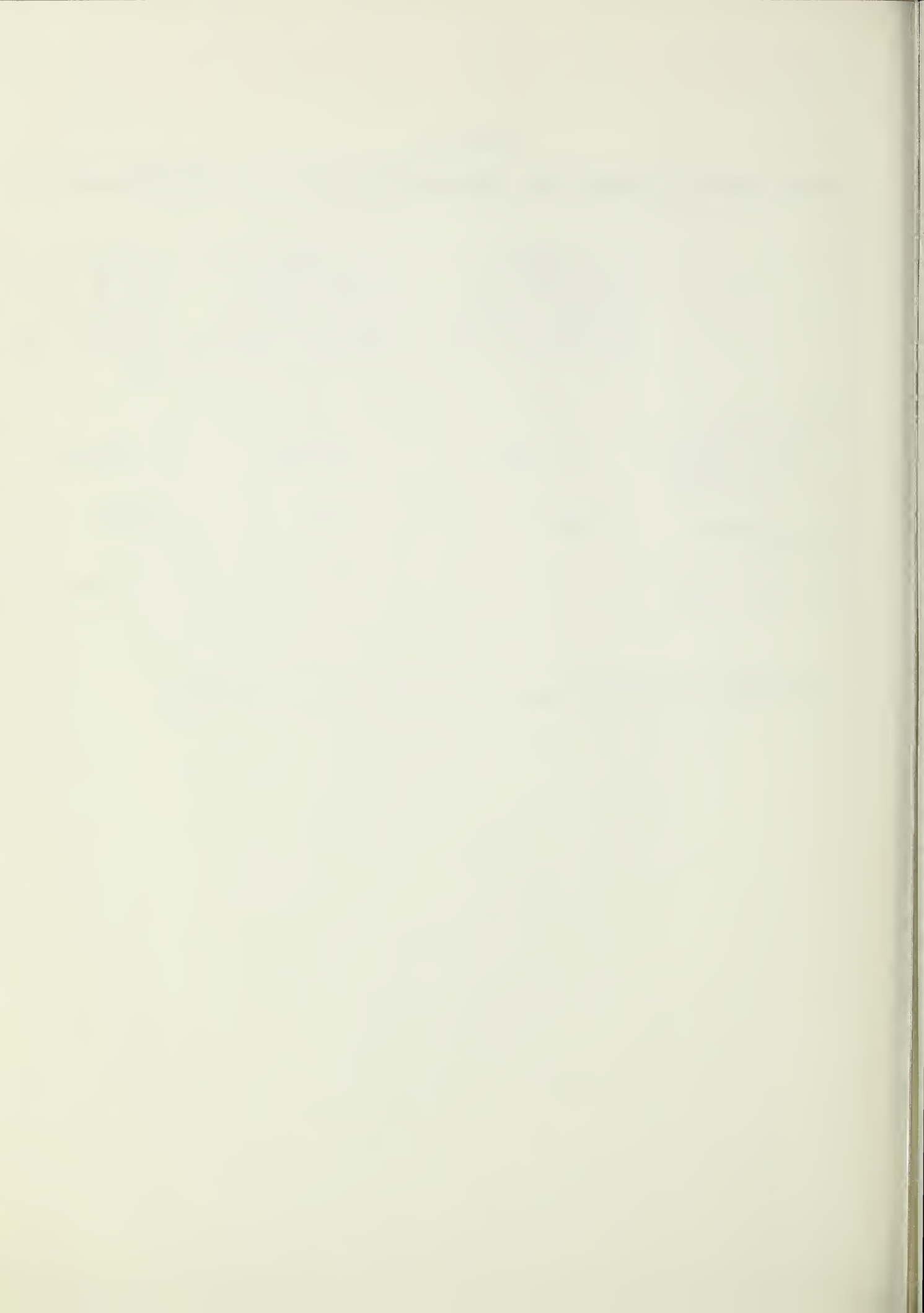


APPENDIX D

RECENT ANALYSES OF SURFACE AND GROUND WATER NEAR SITE 19 - COTTONWOOD CREEK 1/

	Source 1 Cottonwood Creek ¼ mile west of proposed Site 19 dam site. Upstream 300 gal/min.	Source 2 Deep Artesian Well RA #1008-1008S ¾ mile west of proposed Site 19 dam site. 1,800 gpm.	Source 3 Shallow Artesian Well RA #15114 1 mile NE of proposed Site 19 dam site. 540 gpm.
P.H.	8.5	8.0	8.0
Alkalinity:			
a. Phenolphthalein	0	0	0
b. Methyl Orange	171 ppm	205 ppm	153 ppm
all bicarbonates			
Total Hardness (as CaCO ₃)	1,060	1,179	2,070
Dissolved oxygen	-	-	11 ppm

1/ May 1975 - Analyses by Soil Conservation Service personnel.



APPENDIX D

- CHEMICAL ANALYSES OF GROUND WATER FROM QUATERNARY ALLUVIUMAND SAN ANDRES LIMESTONE^{1/}

Well Location (T.16S.,R.25E)	Water- bearing Formation	Date Collected	Tempera- ture (°F.)	Chloride (Cl)	Specific Conductance (micro- mhos @25°C.)
Sec. 3	San Andres and Grayburg	5/21/28 2/8/39	66 -	20 15	- 2,040
Sec. 5	Grayburg	8/11/58 9/9/58 3/3/59	71 72 70	17 15 15	1,780 1,790 1,770
Sec. 6	Alluvium	2/8/39	-	139	2,310
Sec. 8	Alluvium	4/30/57	-	16	1,150
Sec. 11	Alluvium	2/8/39	-	62	2,540
Sec. 11	Alluvium	2/11/44	-	15	979
Sec. 11	Alluvium	9/1/55	65	53	2,440
Sec. 11	Alluvium	9/9/58 1/20/59 3/3/59	65 65 66	55 70 54	2,650 2,560 2,370
Sec. 15	Alluvium	4/30/57	63	134	3,330

^{1/} Hood, J. W., 1963, Saline Ground Water in the Roswell Basin, Chaves and Eddy Counties, New Mexico, 1958-1959; Geol. Survey Water Supply Paper 1539-M, U.S. Geol. Survey.

APPENDIX D

- CHEMICAL ANALYSES OF GROUND WATER FROM SAN ANDRES LIMESTONE

IN SEC. 5 - T.16S. - R.25E.^{1/}

Well Location	Date of Collection	Chloride (Cl) (Mg/L)	Tempera- ture	Specific Conductance	Ph
T. 16S. - R. 25E., Sec. 5	8/21/69	16	-	1790	-
San Andres	8/7/68	11	21°C.	1810	6.9
	8/3/66	22	71°F.	1710	-

^{1/}: U.S.G.S., Water Resources Data for New Mexico,
Pt. 2, Water Quality Records.

APPENDIX E

GLOSSARY

1. Deferred Grazing: Postponing grazing or resting grazing land for a prescribed period.
2. Improved Cropping System: Growing crops in conjunction with tillage practices that will result in a high degree of erosion control and soil improvement and in optimum yields of products.
3. Irrigation Land Leveling: Reshaping the surface of land to be irrigated to planned grades.
4. Irrigation Water Management: Determining and controlling the rate, amount and timing of irrigation water application to soils to supply plant water needs in an efficient manner.
5. Land Treatment: The application of a combination of practices that will meet specific objectives, including: controlling soil erosion, decreasing runoff of rainfall, improving soil and plant productivity, improving wildlife habitat, increasing efficiency of irrigation water use, and improving environmental quality.
6. Land Treatment Measures: Those practices, when applied in proper combination, will meet the objectives of a resource management system.
7. Land Resource Area: Geographic area of land that is characterized by similar patterns of soil, climate, water resources and land use.

8. Proper Grazing Use: Grazing at an intensity which will maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation.
9. Rangeland: Land that is grazed by domestic livestock and big game animals on which the plant community is comprised of native grasses, forbs, and shrubs.
10. Range Management: The application of a combination of practices designed to meet needs and objectives in relation to the specific use of rangeland. Included are planned grazing systems, as well as practices to control livestock grazing, re-establish plant cover, and to improve quality and quantity of forage.
11. Range Site: A distinctive kind of rangeland that differs from other kinds of rangeland in its potential to produce native plants.

